BIOPLAT-EU

Promoting sustainable use of underutilized lands for bioenergy production through a web-based Platform for Europe

D4.2

Report on the application of the tool on the case studies and for different bioenergy value chains selected

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Name	Organization
Marco Colangeli *Lorenzo Traverso* *Michela Morese*	*FAO*
Raul Köhler	*FIB*
Peter Gyuris	*GEO*
Giuseppe Pulighe	*CREA*
Cristian Tantareanu	*ENERO*
Oleksandra Tryboi *Olha Haidai*	*SECB*
Alfonso Calera	*UCLM*

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Table of Contents

1 Introduction

The main objective of WP4 is to validate the work carried out under WP3 and improve it further through verification of the whole webGIS tool, for more efficient and reliable results of its final release. This will be achieved through a series of actions, including the testing of the beta version of the WebGIS tool. Task 4.2 aims to test impact assessments of different value chains for bioenergy production through defined case studies in all BIOPLAT-EU case study countries.

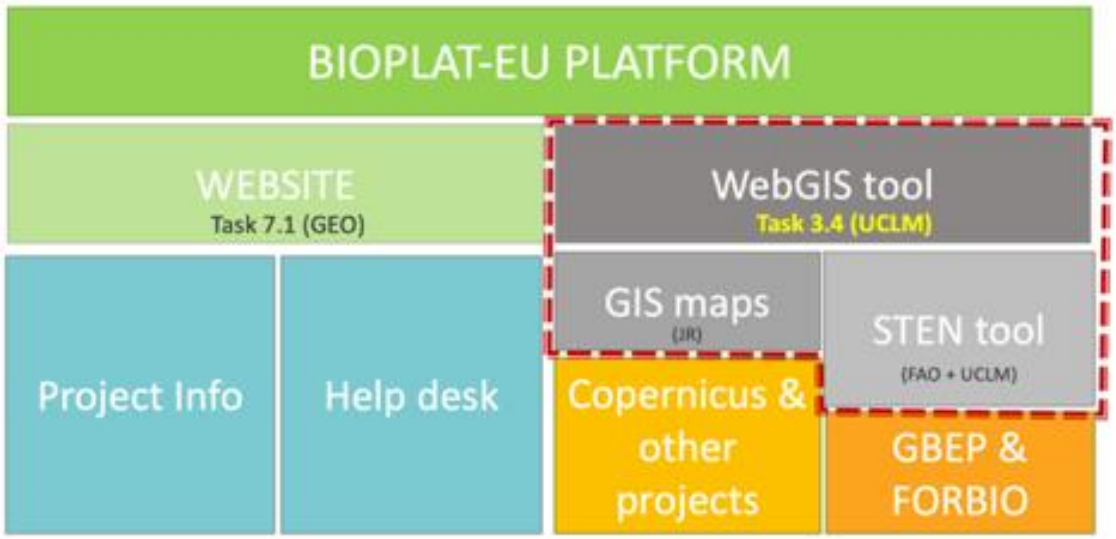


Figure 1. Structure of the BIOPLAT-EU Platform

Specifically, the testing of the tool represented the first official experiment of extensive multi-location access to the BIOPLAT-EU platform and specifically operations within the webGIS tool, performed by members outside the developers of the tool itself.

The testing is meant to benchmark the functionalities of the model, highlight bugs and errors, as well as to assess critically the accuracy of the results. The testing of an incomplete and partial tool would have added limited value to the fine tuning of the WebGIS for the development of a system that works and performs up to expectations. The internal weblink to the tool was shared by the technical team within BIOPLAT-EU with the rest of the consortia starting from its alpha release, though i) several graphical and procedural changes have taken place ever since, with continuity, and ii) several structural changes were also implemented (including addition and re-structuring of entire indicators) until beta version was released. Prior to the release of version beta of the WebGIS, the Consortium held its Progress Meeting. A first presentation of the tool was given with all its active functionalities displayed. This was the occasion for initial feedback and suggestions from the case study partners based on the latest version of the tool. This demonstration was based on a hypothetical test case performed live by FAO. After beta release, BIOPLAT-EU organized a dedicated internal webinar to display the current status of development of the tool and provide a walkthrough to all partners. The results of this exercise have set the foundations for the two-weeks of testing that followed. WP4 leader (FAO) organized and moderated a webinar to which all partners participated. Already during the webinar, initial feedback and questions coming from several partners were addressed and discussed among the technical group of experts working on the development of the webGIS platform. After the webinar, the WP leader instructed all partners to perform two simulations

using the current, beta, version of the webGIS tool on the selected case studies, as per D4.1. The WP leader prepared and shared a template document for the reporting format for all partners to use and instructed through an accompanying email the partners on the best use for such template. The creation of the template was necessary to guide the feedback and obtain comparable evaluations and present clean balanced data that can be accessed from a repository with consistency.

2 Rationale

There were five main areas of interest in the testing phase, each linked to specific software development objectives, which composed the rationale of this Task as listed below:

1. Firstly, feedback was sought on the general characteristics of the tool. These include the **user friendliness, simulation limitations and procedure, clarity of the results, graphical aids, and then tests of platform load** in order to assess the stability of the IT-platform.

2. Consequently, WP leader and Technical Team members needed more specific feedback on how the model works with respect to the quality of the data inserted by the user. Partners were asked to register on the portal and run the analysis as *advanced user*. **This step will return information on the soundness of the algebra and reference values employed.** Some aspects, including formulas and calculations, as well as database information, have known glitches already at the time of issuing of the testing template though there might be other aspects that are not easily detectable by uniformed eyes. The case study partners with their knowledge of the specific value chains and territory are best placed to detect, evaluate and correctly report them in isolation.

3. The testing needs to assess the accuracy of default information (standard users) and compare them with info from field trials and nationally generated data and experiences in the same value chains as tested. **The accuracy level that default values from databases can achieve is within the understanding that a pan-European model like the webGIS platform will never reach accountability of all real-world variables that come to play as a result of field trials. The aim of this second exercise was therefore to evaluate the magnitude of such differential and assess its acceptability.** In other words, if a local expert expects a certain value of an indicator to be within a certain range, the question to be answered from the testing exercise was whether the deviation from such expected range is acceptable or not. This is specific to each data entry (for some parameters a certain deviation in % may be acceptable whereas for a different parameter the same deviation might be unacceptable), thus knowledge of bioenergy sustainability assessment is necessary, and the evaluation of the results was done in synergy with FAO in this case.

4. A fourth key objective of the testing was **to evaluate the learning curve of a first cohort of users (case study Partners) and track how they obtain familiarity with the tool** and its application in their respective case study contexts (case study 1 and 2) to then carry out webinars with local stakeholders and present the BIOPLAT-EU platform and its potential for future use.

5. Last but not least, the testing under Task 4.2 **will define the characteristics of the simulations that will feed into WP6 for the economic and financial assessments and bankability potential of each case study**.

3 Testing Reports

This section of the Deliverable includes the reports performed by each case study Partner using the webGIS tool beta release. The reports were obtained and are published without modifications of any kind, to reflect with full transparency the testing iterations and the impressions of the users.

The results of each testing were discussed with the author and specific points were taken to final conclusion section of this report.

The template for the reports was composed of the following sections:

1 Introduction -

2 Overview

3 Variances

4 Assessment

5 Results

6 Evaluation

7 Summary of Activities

In more details, each section included guidance for the users to fill out its components.

1 Introduction

1.1 Background

This document provides the background for the testing activities within iteration <Doc Ref> through the testing of <Iteration ID> scenario.

This section should contain a brief background and history to this testing exercise which should include: a brief description of the characteristics of the test (make a summary from D4.1), any other relevant supporting information specific to the test (e.g. existing field trials with specific crops nearby, existence of bioenergy plants nearby case study area, etc).

1.2 References

A list of documents referenced within this Test Summary Report document. These may be used to substitute standard values in the value chain data box. If data provided are evaluated more accurate than those included in the VC data box, these might be incorporated and appropriate citation for metadata will be necessary.

2 Overview

This section provides a high-level overview of the significant events and activities documented during the testing. This part should be compiled at the end of the exercise as a summary containing main findings from the exercise.

This section also specifies the scope of the testing (what was and what was not tested), and specifies the test environment details (including the hardware, software and data used in the testing e.g. mobile application, laptop, Mac vs PC, wifi connection performances, etc).

For Example:

The Iteration <Doc Ref> <Iteration ID> scenario for the testing of the WebGIS in the context of Task 4.2 of the BIOPLAT-EU project was begun on June 1st 2021 at 3:41 pm and completed on June 1st 2021 at 3:55 pm. During this testing only the following sections of the WebGIS platform were considered: Layers menu, STEN tool, Info Panels, Value Chain Data Box, Advanced Indicators, Results panel, etc.

The testing was conducted on an HP Notebook Pro with 32Gbytes of memory running Microsoft Windows 10 Professional, a Wi-Fi broadband connection with results from speedtest.net of 162 Mb/s in download and 30 Mb/s in upload. Browser used is Google Chrome.

In addition, it should present a summary of the outcomes of the testing, the number of iterations within the same testing, potential noteworthy aspects (crashes, bugs, or result accuracy, etc).

3 Variances

This section is used to record any variances of the artefacts from those areas agreed on previously, especially in areas that may cause concern to FAO, UCLM and JR evaluating the test results, including any references to supporting documentation that covers the reasons for the deviations (e.g. data, processes, etc.). To this end, remember for instance that GHG emissions in processing stages are calculated as blackbox values starting from information from BioGrace (www.biograce.net). In case for the specific testing you have literature that differs significantly from default values, please include both results (default values + own values) and provide a critical description of these variances.

4 Assessment

This section provides a brief assessment of the comprehensiveness of the testing process for the completed testing phase against the test objectives and constraints specified in the Grant Agreement. For your convenience, below is an excerpt of the intended purpose *"A number of scenarios will also be tested in order to test the accuracy of the tool and its versatility. During this phase, specific efforts will be dedicated to testing the various characteristics of the tool including user friendliness, clarity of the results, as well as overload stress tests in order to assess the stability of the IT-platform."*

Here you should narrate the steps taken, the procedure followed, the responsiveness of the system to your inputs, and the success of your activity. Multiple iterations consequence of trial and error (or learning of the user) should not reported but only a description of such learning process should be provided.

This section also identifies any aspects of the WebGIS platform that were not tested as thoroughly as planned (due to insufficient time, resources, capacity, or system errors, etc).

For Example:

Unfortunately, it was not possible to test the Advanced Indicator INCOME due to lack of primary data on e.g. Labour Costs and requirements.

5 Results

This section provides a summary of the results of the testing, identifies all resolved issues and summarises the details of their resolution, and lists any outstanding issues.

For Example:

Test Case Case Study 1, Italy, Giant Reed for Biogas, was carried out with great ease. The web application responded swiftly to user's inputs, the visualization at screen of the maps however was slightly slow and blocky. No differences were detected in the Layer Tab when selecting the Satellite Imagery vs the Sentinel set of images, making the latter apparently superfluous. The testing revealed problems with the legibility of the results of Indicator "Land Tenure" showing a NaN.ed error message. However, with a subsequent test iteration, where changes to the target area were made, this error disappeared. Etc etc.

6 Evaluation

This section provides an overall evaluation of the testing process including problems and limitations.

For Example:

The Case study 1, Giant reed for biogas, underwent comprehensive testing, with only two defects being observed on .----- and on …… .

Additional Test Cases were designed and executed to explore the Value Chain Data Box legibility, and data accuracy with respect to literature and own observations in the field, following correction and re-testing it is believed that accuracy will be acceptable in use.

Since a number of problems were observed with navigation, and only once re-loading the page re-testing was possible due to slow speed of the server, it is thought that there will be a Medium likelihood of navigation failure in use if user load increases.

7 Summary of Activities

This section provides a summary of the major testing activities and events for the test performed for each <Doc Ref> and <Iteration ID>. This section also summarises testing resource information, such as total staffing levels (how many people performed the *same* test), total testing time, characteristics, etc etc.

For Example:

Test Start Date: June 1st 2021, @3:43 pm *Test End Date: June 1st 2021, @ 3:55 pm*

Item	Planned	Actual
Staff Levels	*3*	*2*
Test Design Effort	*1*	*2*
Test Execution Effort	*2 each*	*5 each*
Re-Test Effort	*1*	*2*
Overall test evaluation	*Positive*	*Positive*
Expected malfunctioning	*NO*	*YES*
Critical malfunctioning	*NO*	*NO*
Overall testing result accuracy	*Good*	*Fair*
Inaccuracy attributable to:	*Data*	*Data*
Layers quality	*MUC lands: High* *Suitability: High* *BPPs: Medium*	*MUC lands: High* *Suitability: Low* *BPPs: High*
Etc. feel free to add other summary categories as you see fit		

3.1 Germany

Test Summary Report

Test Information	
Project ID:	BIOPLAT-EU
Document Ref:	Germany, Case Study 1, District Spree-Neiße
Iteration ID:	A) Sorghum for Biomethane
Author:	*Raul Köhler, FIB (with support of Rainer Schlepphorst, Stefan Lukas, Anne Rademacher)*
Date:	02.06.2021/03.06.2021, 08.06.2021-10.06.2021

1 Introduction

1.1 Background

This document provides the background for the testing activities within iteration Germany, Case Study 1, District Spree-Neiße through the testing of A) Sorghum for biomethane scenario.

The case study area 1 – the district *Spree-Neiße* – is situated in the Lusatian Lowland in the southeastern part of the Federal State Brandenburg. Currently four opencast lignite mines are still in operation within the Eastern German lignite district (Lusatia), two of them in the selected case study area. The potential biomass production sites (BPS) are located in the reclaimed area of the running opencast mines. The next known biomethane facility is situated in Luckaitztal in the neighbouring district Oberspreewald-Lausitz. Some trials of sorghum were directly carried out on agricultural land in the post-mining area (see Theiß et al. 2014 and Märtin & Barthelmes 2014).

1.2 References

THEIß, M., JÄKEL, K., PÖTZSCHKE, K., SCHAERFF, A., 2014: TV 4 Substratqualität und Biogaspotenzial, Wirtschaftlichkeit des Sorghumanbaus. In: SÄCHSISCHES LANDESAMT FÜR UMWELT, LANDWIRTSCHAFT UND GEOLOGIE (ed.): Pflanzenbauliche, ökonomische und ökologische Bewertung von Sorghumarten und -hybriden als Energiepflanzen, Final report

Märtin, M., Barthelmes, G., 2014: Herbizidprüfung, Anbau auf Rekultivierungsstandorten und Praxisumfrage zum Sorghumanbau. In: JÄKEL, K. (ed): Abschlussbericht zum Verbundvorhaben: Pflanzenbauliche, ökonomische und ökologische Bewertung von Sorghumarten und -hybriden als Energiepflanzen. Abschlussbericht, 75-100.

Gömann H., Witte T. de, Peter G., Tietz A., 2013: Auswirkungen der Biogaserzeugung auf die Landwirtschaft. Braunschweig: Johann Heinrich von Thünen-Institut, 78 p, Thünen Rep 10, DOI:10.3220/REP_10_2013, https://www.thuenen.de/media/publikationen/thuenen-report/Thuenen-Report_10.pdf

FNR: Basic figures on biogas technology, access 06/2021, https://biogas.fnr.de/daten-und-fakten/faustzahlen

KTBL: Economic efficiency calculator for biogas, access 06/2021, https://daten.ktbl.de/biogas/startseite.do?zustandReq=79&selectedAction=showMona#start

FNR, 2012: Sorghumhirsen – Ein Beitrag zur Diversifizierung des Energiepflanzenspektrums. 28 Seiten, https://mediathek.fnr.de/media/downloadable/files/samples/b/r/brosch.hirse-web.pdf

Wagner, M., Knoblauch, S., 2011: Wassernutzungseffizienz und Wasserverbrauch von Sorghum bicolor im Vergleich zu Energiemais. 14. Gumpensteiner Lysimetertagung 2011, 215 – 218, ISBN: 978-3-902559-61-6,

DENA, 2020: Branchenbarometer Biomethan 2020, 14 Seiten, https://www.dena.de/fileadmin/dena/Publikationen/PDFs/2020/Brachenbarometer_Biomethan_2020.pdf

A list of documents referenced within this Test Summary Report document. These may be used to substitute standard values in the value chain data box. If data provided are evaluated more accurate than those included in the VC data box, these might be incorporated and appropriate citation for metadata will be necessary.

2 Overview

The Iteration Germany, Case Study 1, District Spree-Neiße scenario A) Sorghum for biomethane for the testing of the WebGIS in the context of Task 4.2 of the BIOPLAT-EU project was started on June 2nd 2021 at 01:00 pm and finally completed on June 10th 2021 at 10:00 am. Although the tool is also offered in the national language (German), the test was conducted exclusively in English. The correct translation is checked separately. During the testing phase, the following sections of the WebGIS platform were considered:

- Layers menu,
- Background layers,
- Map tools (zoom in, out),
- STEN tool,
- Info Panels,
- Legends,
- Value Chain Data Box,
- Advanced Indicators,
- Results panel

The testing was conducted on a PC with 16 Gbytes of memory running Microsoft Windows 7 Professional, a broadband internet connection with results from speedtest.net of about 92 Mb/s

in download. The upload was blocked by the firewall. The browser used is Firefox 89.0 (64-Bit).

A second machine with 16 Gbytes of memory running Microsoft Windows 10 Pro, a broadband internet connection with results from speedtest.net of about 94 Mb/s in download and upload of 90 Mb/s was used for comparing testing. The browser used is Firefox 88.01 (64-Bit).

A tablet with 4 Gbytes of memory running Android 9 with a 10.1" FullHD screen was used as third device option. It uses a WLAN internet connection with 96 Mb/s.

Additionally, navigating and selection was checked on a smartphone (Redmi Note 7, 6.3" FullHD screen, 6 Gbyte RAM, Android 9).

The testing (crop management: high, rainfed, pathway biomethane, BBP: nearest location) was performed 6 times with the following adaptions:

1) default parameters;

2) change only yield to 10 Mg/ha (expected mean);

3) change only yield to 15 Mg/ha (expected maximum);

4) change yield to 15 Mg/ha (expected maximum) and BBPs location to correct position based on aerial photo;

5) change all parameter in the value chain data box according to description under 3. Variances and BBPs location;

6) comparison with maize (default yield, high crop management, irrigated).

3 Variances

Value Chain Data Box – values

- *'Crop Information':*
  The yield is too low (5.6 t/ha). Experiences from field trials on agricultural land in the Lusatian region and on reclaimed lignite mines show an comparable yield to maize between 10 and 17 t/ha (Theiss et al. 2014).
  The location of the two checked BBP are not accurate, but it could be manually put in the correct place.
  The default water requirement is on the high level, but within limits. On sandy reclamation sites the water consumption is be expected between 4,000 and 5,000 m³/yr/ha (Wagner & Knoblauch, 2011). Used testing value: 4,500
- *'Agronomic Information'*:
  The amount of fertilizers are relative low. The nutrition demand of sorghum is partially much higher (FNR, 2012). The following quantities are usually applied as basic fertilization to agricultural lignite reclamation areas, as they are young raw soils: N – 120 kg/ha, P 60 kg/ha, K 200 kg/ha.
- *'Bioenergy Production'*:
  The LHV (lower heating value) of the selected feedstock (16,240 MJ/Mg) is high. Using the values from https://biogas.fnr.de/daten-und-fakten/faustzahlen the energy content of Sorghum should be near 11,400 MJ/Mg (15 Mg/ha → 4,750 m³/ha with 36 MJ/m³).

The ‘water consumption for feedstock processing’ is too low. The water requirement is 0.2 m³ per m³ of raw gas, which means 58.2 m³/Mg feedstock (see Gömann et al. 2013).
‘MJ of energy input per unit of feedstock processed’ is too low (1 MJ/t). According to KTBL the power demand is 0.25 kWh per processed raw gas. Using the conversion 1 MJ = 0.2777 kWh (https://www.iea.org/reports/unit-converter-and-glossary) and the initial amount of about 317 m³ methan/Mg feedstock leads to 285 MJ/Mg.
In 2020 the mean market price in Germany was about 6 ct/kWh (DENA, 2020) which are 0.22 EURO/MJ.

Energy Access – values

– It was not possible to check the parameter due to lack of primary data access.

Income – values

– The values were adapted according the parameter in the value chain data box (e.g. sum of amount of fertilizers: 400 kg/ha, explanation: K and P are applied as needed i.e. after testing). Seeds/Prices were also adapted (~300,000 seeds/ha, ~160 EURO).

4 Assessment

The testing started with the loading of the website and the logging in as advanced user.

– It would be a benefit if the BIOPLAT-EU logo (direct above the ‘Layers’) is linked to our project webpage.

a) General navigation and selection process

– First, the different background maps were checked at pan-European screen position. The *Bing – Arial* and the *Bing – Road* maps were not displayed. (Update on 08.06.2021: now all background maps were displayed.)
– After successfully switching to OSM maps and zooming to the German case study area, the appearance of the individual layers was checked. All layers were displayed correctly. However, there were some performance issues when activating the crops suitability maps and zooming (Firefox/Chrome).
– In the next step, the button ‘info layer’ of each layer was clicked. The information as box are sound but there is an error with the metadata from ‘Administrative limits’ regarding the loading of xslt-stylesheets (in Firefox). When using the tablet with Chrome browser, the metadata file was shown without errors. The ‘Crops suitability’ information should be completed with the explanation of data sources and methodology to avoid confusion and disappointment among users.
– There are minor issues with the selection process of a BPS: You must zoom in far before the selection process becomes visually comprehensible (red border of polygon, tool tip with ha). If the ‘i’ button is inactive at the same time, e.g. because you have displayed the legend, and you have not read the ‘quick help’ either, you are not able to do the selection. It would be more user friendly to change automatically to the ‘i’ button when a MUC land was selected (1. check the status of the ‘i’ button and 2. change to status *activate*).
– The area size shown in the right information box is not the same as the surface of BPS in STEN tool.

– The selection process of a MUC area and value chain is more difficult on the tablet, because the left tool box frame (STEN) uses about 50% of the screen width (landscape mode). You need also the right info box (Summary/Information/ Legend/Quick Help etc.) for selecting. At this moment, the visible part of the map is insufficient. At portrait mode the tool frames overlap. On the other hand, you can minimize both tool frames/windows to see the map. Therefore, it is usable but less comfortable than on a PC with larger screens.
– The user of a smartphone faces the same problems as with the tablet. Nevertheless, minimizing the both tool frames is a solution as well.
– The selection of crop management, water supply, the crop and bioenergy pathway was intuitive and without problems. There is one serious exception: the selection of crops whose feasibility is less than 30% cannot be selected. This will mean that Case study 2 cannot be carried out with the planned crops Poplar or Miscanthus.
– Another issue is related to the selection of maize: the user can only select the combination of Rainfed and Low 'Crop management practice'. This should extended to High.
– If you click on the 'Accept' button without waiting for the tool to calculate the route to the BBP, it cannot start the simulation process in the value chain data box. One simple solution is waiting but a preliminary check by the webGIS tool could avoid user errors.
– From the advanced user's point of view, it would be a very useful feature to have multiple MUC areas selected and calculated them in a queue with the same average basic settings (crop management, crop, yield, bioenergy pathway) and get a summarized result.

b) Value Chain Data Box – layout, design, etc.

– The right box shows the summary of the selection process but it is called 'Defined Target Area'. Is this the correct term?
– Sometimes the map on the right side is not shown (value chain data box, results) (Firefox).
– The unit 'ton' should be used in a consistent way. Depending on the country (UK, US, CA) it could mean different weights (about 907 kg or 1,016 kg), which should be avoided. See https://en.wikipedia.org/wiki/Ton. 'Metric ton' or 'tonne' means 1000 kg. Perhaps we should use the official SI unit 'megagram' (symbol: Mg) (see https://en.wikipedia.org/wiki/Megagram). This refers to the selection process, the value chain data box, and the results.
– All units in the value chain data box and the results must be checked regarding consistence (e.g. unit 'ha' instead of 'Ha', 'Tonnes' vs. 'T' vs. 'ton', 'yr'/'year').
– Abbreviations that are not commonly used should be written as full name ('household' instead of 'HH', in German users will automatically link HH with Hamburg).

c) Value Chain Data Box – values

The values in 'Target Area' refers to three municipalities and are comprehensible.

'Crop Information':

- The changes are described in chapter 3. Variances.

'Agronomic Information':

- ‘Level of mechanization’ is plausible as well as the ‘amount of applied pesticides’.
- Changes are described in chapter 3. Variances.
- The number of jobs could not be evaluated.

‘Bioenergy Production’:

- The ratio ‘MJ of Bioenergy product(s)/MJ feedstock’ is much too low or the unit ‘%’ is inappropriate.
- There may be a duplication with ‘EU market price of bioenergy product’ and ‘Cost of raw material (per MJ of bioenergy product)’.

‘Transport of Feedstock/SVO/Bioenergy Products’:

- The number of job positions are zero. Perhaps it should not refer to tonnes and km, but only to Mg feedstock to generate meaningful results on target are level.

d) Energy Access – values

It was not possible to check the parameter due to lack of primary data access.

e) Income – values

The changes are described in chapter 3. Variances.

f) Results – layout, design

−The calculation was very fast and the results were clearly presented in tables. However, there are some issues with superscripted and subscripted units.
−There are some indicators, which work as percentage, like ‘Land Use and Cover Change’. For these, the row description (currently only ‘Percentage’) should clearly state the reference (perhaps ‘Percentage of Target Area’).
−In ‘Advanced Indicators’ / ‘Energy Access’ there are several percentage values which refers to different levels (target area, national, EU). The level could be highlighted to make the values easier to read.
−It is somewhat unusual that the position of ‘Unit’ (column title) changes between the two tables ‘Income’ and ‘Energy Access’, but of course there is a lot of information to show.

g) Results – values

−Some values are very low for the selected case due to the small area of the selected BPS. E. g. the indicators for ‘Capacity’ on national and EU level are 0.000.
−The ‘Advanced Indicator’ / ‘Energy Access’ indicators show only 0.00, possibly they are too small for the selected units and the field size.
−The explanation of each indicator within the tables is of great value. Additionally, a link to the definition and background of the indicators should be available, because not all indicators are self-explaining. I am not sure, if stakeholders like i.e. farmers are able to interpret all results and indicators correctly without further help.

h) Results – export

−Next to the symbol of the pdf document should be a short description like ‘Export’. Using a tablet or smartphone, the icon is easy to miss because it is not at the top of the page but below the map and next to ‘Results’.

– The export function works satisfactorily. However, sometimes no map is included in the document (Firefox, correspond with the missing map in value chain data box).
– The field 'Amount of applied pesticides' under 'Value Chain Data Box' / 'Agronomic Information' is duplicated.

5 Results

Test Case Case Study 1, Germany, Sorghum for Biomethane, was carried out with no major problems.

The webGIS tool responded promptly to user's input. Depending on the active map, the response time of the website was slightly delayed.

In the current state, the tool has some minor presentation issues with i.e. units (superscript, subscript) or the selection process. There were no error messages, but some very low values or 0.000.

The advanced user can easily adjust all input values. This is a crucial methodological approach, because the default values cannot represent all local specific characteristics.

One important success factor may be the further explanation and support for the interpretation of the calculated indicators.

A most important outstanding issue is the access of the advanced user to all crops, independent of the suitability maps.

The multiple selection of MUC land and the calculation in a batch would be a very useful feature upgrade for advanced users.

6 Evaluation

The Case study 1, Sorghum for biomethane, underwent comprehensive testing with no major defects. Additional Test Cases were designed and executed to explore the Value Chain Data Box legibility, and data accuracy with respect to literature and own observations in the field, following correction and re-testing it is believed that accuracy will be acceptable in use.

The tool was stable, no re-loading was necessary on all machines.

7 Summary of Activities

Iteration Germany, Case Study 1, District Spree-Neiße scenario A) Sorghum for biomethane with six different input parameter options and four different hardware variants (see chapter 2.).

Test Start Date: June 2st 2021, @1:00 pm Test End Date: June 10st 2021, @ 10:00 am

Item	**Planned**	**Actual**
Staff Levels	*2*	*2 (+2 supporting)*
Test Design Effort	*1*	*2*
Test Execution Effort	*2 each*	*2 each*

Re-Test Effort	*1*	*1*
Data checking Effort	*2*	*4*
Overall test evaluation	*Positive*	*Positive*
Expected malfunctioning	*NO*	*NO*
Critical malfunctioning	*NO*	*NO*
Overall testing result accuracy	*Good*	*Fair*
Inaccuracy attributable to:	*Data*	*Data* *Suitability maps*
Layers quality	*MUC lands: High* *Suitability: Medium* *BPPs: Medium*	*MUC lands: High* *Suitability: Low* *BPPs: Medium (position issues)*
Usability on Computer	*Good*	*Good*
Usability on mobile devices	*Good*	*Fair*

Test Summary Report

Test Information	
Project ID:	BIOPLAT-EU
Document Ref:	Germany, Case Study 2, District Dahme-Spreewald
Iteration ID:	B) Poplar for CHP (solid biomass)
Author:	*Raul Köhler, FIB (with support of Rainer Schlepphorst)*
Date:	16.06.2021/17.06.2021

1 Introduction

1.1 Background

This document provides the background for the testing activities within iteration Germany, Case Study 2, District Dahme-Spreewald through the testing of poplar for CHP (solid biomass) scenario.

The case study area 2, district Dahme-Spreewald, is located in the Lusatian Lowland in the southeastern part of the federal state Brandenburg. The potential biomass production sites (BPS) are located in the disused sewage irrigation fields. Long irrigation periods with excessive loads of nutrients and increasing pollutants impaired the soil fertility. In addition, hazardous substances of industrial wastewater (e.g. heavy metals) cumulated in the topsoil affecting both plant growth of sensible species and crop utilization.

Today the former sewage irrigation fields are mainly used as agricultural fallow land and as a land backup for compensation measures in nature protection. The next bioenergy production plant is situated in Königs Wusterhausen (about 6 km).

1.2 References

Knur, L., Murach, D., Murn, Y., Bilke, G., Muchin, A., Grundmann, P., Eberts, J., Schneider, U., Grünewald, H., Schultze, B., Quinkenstein, A., Jochheim, H. (2007): Potentials, economy and ecology of a sustainable supply with wooden biomass. In: 15th Europ.Biomass Conf. Proceedings, Berlin, May 2007.

Carmen e.V. (2021): Market prices for wood chips, https://www.carmen-ev.de/service/marktueberblick/marktpreise-energieholz/marktpreise-hackschnitzel/

LfULG (2014): Schnellwachsende Baumarten im Kurzumtrieb - Anbauempfehlungen. 76 pages, https://www.lignovis.com/fileadmin/user_upload/PDF/Ext/2014_11_Schnellwachsende_Baumarten_Kurzumtrieb_Sachsen_SMUL.pdf

A list of documents referenced within this Test Summary Report document. These may be used to substitute standard values in the value chain data box. If data provided are evaluated more accurate than those included in the VC data box, these might be incorporated and appropriate citation for metadata will be necessary.

2 Overview

The Iteration Germany, Case Study 2, District Dahme-Spreewald scenario B) Poplar for CHP (solid biomass) for the testing of the WebGIS in the context of Task 4.2 of the BIOPLAT-EU project was started on June 17th 2021 at 08:00 pm and finally completed on June 17th 2021 at 04:30 pm. Although the tool is also offered in the national language (German), the test was conducted exclusively in English. The correct translation is checked separately. During the testing phase, the following sections of the WebGIS platform were considered:

- STEN tool,
- Info Panels,
- Value Chain Data Box,
- Advanced Indicators,
- Results panel

The testing was conducted on a PC with 16 Gbytes of memory running Microsoft Windows 7 Professional, a broadband internet connection with results from speedtest.net of about 92 Mb/s in download. The upload was blocked by the firewall. The browser used is Firefox 89.0.1 (64-Bit).

The testing (crop management: high, rainfed, pathway CHP (solid biomass), BBP: nearest location) was performed 2 times with the following adaptions:

1) changed only yield to 6.5 Mg/ha (expected mean);

2) changed all parameter in the value chain data box according to description under 3. Variances

3 Variances

Value Chain Data Box – values

- *'Crop Information':*
  The default water requirement reflects current findings (Knur et al. 2007).
- The market price was changed to 75 €/ton regarding to Carmen e.V. (2021).
- *'Agronomic Information'*:
  The amount of fertilizers are too high for low yielding SRC in the Northeastern German lowlands. The following quantities can be applied as fertilization: N – 22 kg/ha, P 4 kg/ha, K 16 kg/ha (LfULG, 2014).
- In the year of the planting, the cuttings must be kept as free as possible from weeds, e.g. by using herbicides: 3 kg/ha.
- *'Bioenergy Production'*:
  The LHV of the selected feedstock (15,000 MJ/Mg) is correct.
  In 2020 the mean market price in Germany was about 6 ct/kWh (DENA, 2020) which are 0.22 EURO/MJ.

Energy Access – values

- It was not possible to check the parameter due to lack of primary data access.

Income – values

- The SRC was planned with a short-term rotation period. Therefore 10,000 cuttings per ha will be used.
- The basal fertilizer in year 1: 80 kg/ha; and herbicides: 3 kg/ha.
- The working time is adapted to typical values.
- There is no harvesting in year 1.

4 Assessment

The testing started with the loading of the website and the logging in as advanced user. Detailed comments about general navigation and selection process were made in the report to iteration 'Germany, Case Study 1'.

Update (17.06.2021):

– Selection:

The 'Layers'/'Info Layer' are not working anymore.

– The advanced user can now select crops whose feasibility is less than 30%. The advanced editing provides an additional selection window (currently still called 'Editar cultivo') which can be used intuitively.

– Value Chain Data Box:

The manually corrected yield (6.5 Mg/ha) was overwritten by 3.00 T/ha after clicking 'Accept'. The value can be corrected by using the editing tool another time or by editing the yield in the 'Value Chain Data Box'.

– There is an issue with the amount of fertilizers, etc.: The advanced user can change the values for N, P, K, pesticides etc. in the 'Value Chain Data Box (standard)' / 'Agronomic Information'. However, it must clearly indicated, which kind of input value (in kg/ha) is expected: the nutrient element itself ('chemical' ?) or the chemical compound, e.g. nitrate (NO_3^-).

– Furthermore, if you have selected a perennial crop it is not clear if the amount of fertilizer refers to only one year (and will repeated yearly) or to the whole simulation period (20 years).
In addition, in the advanced section 'Income' there is a subdivision between different time slices (Year 1, Year 2-20) for which is not clear how they are related to the standard input parameters. The column heading 'Year 2-20' should explicitly describe the time reference of the expected input variable: Should the user uses summarized amounts for 19 years or the yearly mean of amount?
Both issues can be addressed easily by using unique column headings or units, e.g. kg/ha/year.
– Results:
The comparison chart with 'Fossil Fuel' is very nice and clearly shows the potential impact of the selected bioenergy pathway. It should be specified which values where used for the calculation of the 'Fossil Fuel'. It would be great if this kind of comparison chart could be used to visualize one important aspect of other standard indicator too.
– *'Advanced Indicator' / 'Income'*:
When using default values (poplar with yield of 6.5 Mg/ha) the annual gross profit and annual net profit are positive (72,775 Euro and 28,492 Euro). After the adaption of the planting costs to 10,000 plants per 0.16 Euro (1,600 Euro/ha) the advanced indicator 'Income' was negative (-422,749 / -462,227 Euro). This is a major discrepancy to version 1 (default values with 6.5 Mg/ha).
Switching all 'income' values to 0.00 in the value chain data box showed that only the income of the total feedstock production of one year (the first ?) was calculated (2,231 Mg * 75 Euro/Mg = 167,000 Euros). The feedstock of the year 2-20 was not calculated and so the yearly gross and net margin at the farm gate is not correct, because the costs in the first year are much higher than in the following years. The yearly gross and net profit of a perennial crop should be a mean value of the complete processing period.
– *'Advanced Indicator' / 'Income*':
There is a discrepancy between row *€* and *€ ha-1 yr*. Since the second row is probably calculated from the first, they should have the same sign (negative vs. positive).

5 Results

Test Case Case Study 2, Germany, Poplar for CHP (solid biomass), was carried out with no major problems.
The webGIS tool responded promptly to user's input. Depending on the active map, the response time of the website was slightly delayed.
In the current state, the tool has some minor presentation issues with i.e. units (superscript, subscript) or the selection process. There were no error messages, but some very low values or 0.000.
The advanced user can easily adjust all input values. This is a crucial methodological approach, because the default values cannot represent all local specific characteristics. The advanced user can now select each crop preselected in the BIOPLAT-EU project, which gives new testing abilities to the user.
One important success factor may be the further explanation and support for the interpretation of the calculated indicators. The intuitive comparison chart about the indicator 'Air Quality' is a good example.

It is necessary to double-check the calculation algorithm of the gross and net margin indicators (Advanced Indicators / Income) for perennial crops to include all feedstock produced during the production period.
The multiple selection of MUC land and the calculation in a batch would be a very useful feature upgrade for advanced users.

6 Evaluation

The Case study 2, Poplar for CHP (solid biomass), underwent comprehensive testing with no major defects. Additional Test Cases were designed and executed to explore the Value Chain Data Box legibility, and data accuracy with respect to literature and own observations in the field, following correction and re-testing it is believed that accuracy will be acceptable in use.
The tool was stable, no re-loading was necessary.

7 Summary of Activities

Iteration Germany, Case Study 2, Poplar for CHP (solid biomass) with two different input parameter options (see chapter 2.).

Test Start Date: June 17th 2021, @8:00 am Test End Date: June 17th 2021, @ 04:30 pm

Item	**Planned**	**Actual**
Staff Levels	*1*	*1 (+1 supporting)*
Test Design Effort	*1*	*1*
Test Execution Effort	*2 each*	*2 each*
Re-Test Effort	*1*	*1*
Data checking Effort	*2*	*2*
Overall test evaluation	*Positive*	*Positive*
Expected malfunctioning	*NO*	*NO*
Critical malfunctioning	*NO*	*NO*
Overall testing result accuracy	*Good*	*Fair*
Inaccuracy attributable to:	*Data*	*Data*

Layers quality	*MUC lands: High* *Suitability: Medium* *BPPs: Medium*	*MUC lands: High* *Suitability: Low* *BPPs: High*
Usability on Computer	*Good*	*Good*

3.2 Hungary

Test Summary Report

Test Information	
Project ID:	BIOPLA-EU
Document Ref:	Hungarian case study 2, Veszprém county
Iteration ID:	"hypothetical" woody crops for CHP (gasification) on contaminated land
Author:	Peter Gyuris, Project Manager
Date:	2021-06-14

1 Introduction

1.1 Background

This document provides the background for the testing activities within iteration Hungarian case study 2, Veszprém county through the testing of "hypothetical" woody crops for CHP (gasification) on contaminated land" scenario.

We are testing the selected scenario based on the crop suitability summed up in D41.

The Biomass Processing Plant must be established in the webGIS tool, on the map, because no such facility (CHP) known to be existent in the region.

1.2 References

Bioplat-EU project deliverable D4.1.

Please note, we do consider that the contaminated land layer and the production logic of this layer, produced by Joanneum Researh for this project, inside Hungary's country border are not correct. These lands are not contaminated in reality. In fact, they are productive lands (recreation, arable lands, forests, etc.). We only use the layer to test the tool, but not for suggesting this is really "available" land. These lands can not be used for bioenergy projects in reality.

2 Overview

The Iteration Hungarian case study 2, Veszprém county "hypothetical" woody crops for CHP (gasification) on contaminated land" scenario for the testing of the WebGIS in the context of Task 4.2

of the BIOPLAT-EU project was begun on June 14th, 2021 at 17:00 pm and completed on June 14th , 2021 at 17:45 pm. During this testing the following sections of the WebGIS platform were considered: Layers menu, STEN tool, Info Panels, Value Chain Data Box, Advanced Indicators, Results panel.

The testing was conducted on a Dell notebook (10th gen. i5 proc.) with 16Gbytes of memory running Microsoft Windows 10 Professional, a mobile 3g connection (Vodafone HU). Browser used is Firefox.

3 Variances

N/A

4 Assessment

Quick zoom function was used to zoom to Veszprém county then "contaminated land" layer was selected. HU. Field name "HU21325803HU00000270" was chosen for further work (1240 ha). Contaminated land layer was used.

The assessment was straightforward selecting the agronomic variables (rainfed, high crop management practices) for poplar.

The CHP processing plant (value chain) was suggested by WP4 leader.

We have set the BPP on the map more or less into the middle of the county, 54kms away, from the BPS.

Then accepted the value chain and went to the value chain data box.

No changes in the value chain data box have been issued.

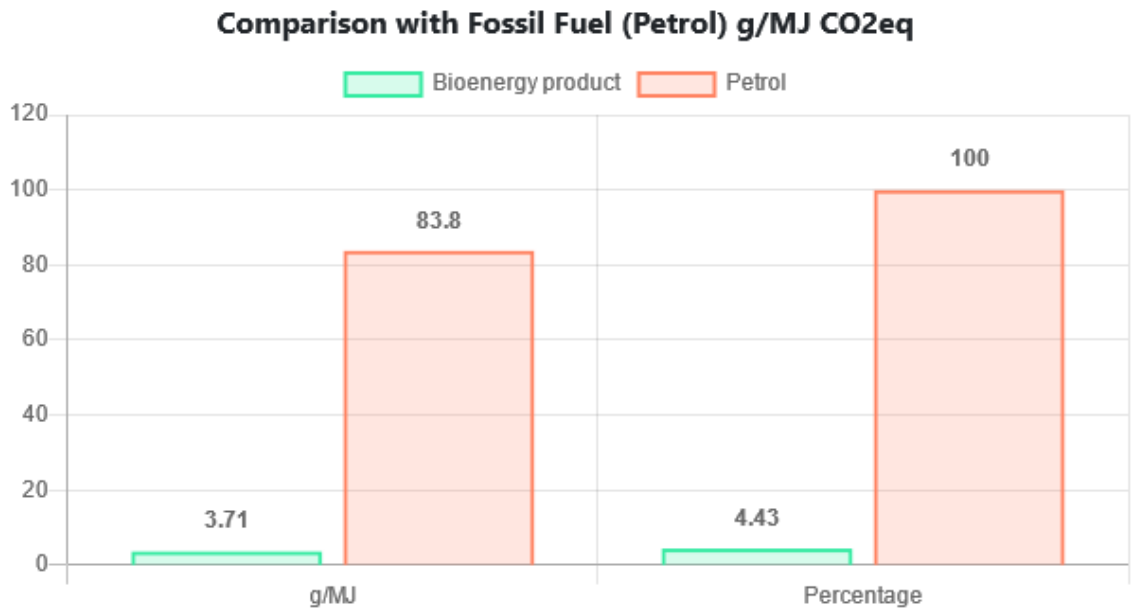
5 Results

Test Case Hungarian case study 2, Veszprém county "hypothetical" woody crops for CHP (gasification) on contaminated land", was carried out with great ease. The web application responded swiftly to user's inputs.

Sometimes odd category names (see below chapter 6.) lead to unclear interpretation of simulation results.

Final figures and the layout of the simulation results can be read with no problem.

This part of the online report is not displayed in the report PDF.



6 Evaluation

This section provides an overall evaluation of the testing process including problems and limitations.

Bioenergy production "LHV of FSTK" records could not be understood, looked odd without explanation.

On the Energy access tab "Number of HH benefiting from electricity" could not be understood without explanation.

If we want to switch between rainfed or irrigated water supply, high or low practices then suitability and yield information disappears and can't be read.

7 Summary of Activities

This section provides a summary of the major testing activities and events for the test performed for Hungarian case study 2, Veszprém county through the testing of "hypothetical" woody crops for CHP (gasification) on contaminated land".

Test Start Date: June 14th 2021, @17:00 pm Test End Date: June 14th 2021, @ 17:45 pm

Item	Planned	Actual
Staff Levels	1	1
Test Design Effort	1	2
Test Execution Effort	1 each	2 each
Re-Test Effort	1	1
Overall test evaluation	Positive	Positive
Expected malfunctioning	NO	YES

Critical malfunctioning	NO	NO
Overall testing result accuracy	Good	Fair
Inaccuracy attributable to:	Data	Data
Layers quality	MUC lands: high Suitability: High BPPs: High	MUC lands: low Suitability: medium BPPs: High
Etc. feel free to add other summary categories as you see fit		

Test Summary Report

Test Information	
Project ID:	BIOPLA-EU
Document Ref:	Hungarian case study 2, Veszprém county
Iteration ID:	Sunflower for biodiesel on UU land
Author:	Peter Gyuris, Project Manager
Date:	2021-06-14

1 Introduction

1.1 Background

This document provides the background for the testing activities within iteration Hungarian case study 2, Veszprém county through the testing of "Sunflower for biodiesel on UU land" scenario.

We are testing the selected scenario based on the land availability and crop suitability summed up in D4.1. The available BPP (Rossi Biofuel) from near the case study region was suggested by the webGIS tool. In D4.1 we did not indicate this conversion technology.

1.2 References

Bioplat-EU project deliverable D4.1.

2 Overview

The Iteration Hungarian case study 2, Veszprém county "Sunflower for biodiesel on UU land" scenario for the testing of the WebGIS in the context of Task 4.2 of the BIOPLAT-EU project was begun on June 7th 2021 at 13:43 pm and completed on June 14th , 2021 at 16:00 pm. During this testing the following sections of the WebGIS platform were considered: Layers menu, STEN tool, Info Panels, Value Chain Data Box, Advanced Indicators, Results panel.

The testing was conducted on a Dell notebook (10th gen. i5 proc.) with 16Gbytes of memory running Microsoft Windows 10 Professional, a mobile 3g connection (Vodafone HU). Browser used is Firefox.

3 Variances

N/A

4 Assessment

Quick zoom function was used to zoom to a field near Gyulafirátót, HU. Field ID HU21311767HU00002017 was chosen for further work (184.34 ha).

The assessment was straightforward selecting the agronomic variables (rainfed, high crop management practices) for the crop sunflower. Suitability (77%) and yield (3.1 tons) looked good to follow with this feedstock.

Then choosing the bioenergy pathway offered by the system looked okay for the biodiesel BPP near the case study area.

This biodiesel processing plant (value chain) wasn't considered in D4.1.

Crushing and distributor distances stayed default (100kms).

No changes in the value chain data box has been issued.

5 Results

Test Case Hungarian case study 2, Veszprém county "Sunflower for biodiesel on UU land", was carried out with great ease. The web application responded swiftly to user's inputs.

Sometimes odd category names (see below chapter 6.) lead to unclear interpretation of simulation results.

Final figures and the layout of the simulation results can be read with no problem.

6 Evaluation

This section provides an overall evaluation of the testing process including problems and limitations.

In the value chain data box the biomass production site (municipalities affected) was not displayed.

Bioenergy production "LHV of FSTK" records could not be understood, looked odd without explanation.

On the Energy access tab "Number of HH benefiting from electricity" could not be understood without explanation.

In the test results report the bars ("Comparison with Fossil Fuel (Petrol)") among standard indicators are not displayed in the exported PDF.

The Hungarian translation (text) in the tool needs a very strong revision as expressions are cautious and they are very much meaningless.

7 Summary of Activities

3.2.1.1.1 This section provides a summary of the major testing activities and events for the test performed for Hungarian case study 2, Veszprém county through the testing of "Sunflower for biodiesel on UU land".

3.2.1.1.2 For Example:

Test Start Date: June 14th 2021, @13:43 pm Test End Date: June 14th 2021, @ 16:00 pm

Item	Planned	Actual

Staff Levels	1	1
Test Design Effort	1	1
Test Execution Effort	2 each	2 each
Re-Test Effort	1	1
Overall test evaluation	Positive	Positive
Expected malfunctioning	NO	NO
Critical malfunctioning	NO	NO
Overall testing result accuracy	Good	Fair
Inaccuracy attributable to:	Data	Data
Layers quality	MUC lands: high Suitability: High BPPs: High	MUC lands: low Suitability: medium BPPs: High
Etc. feel free to add other summary categories as you see fit		

3.3 Italy

Test Summary Report

Test Information	
Project ID:	BIOPLA-EU
Document Ref:	Case Study 1, Sulcis Region, Italy
Iteration ID:	A) Wheat for biogas
Author:	Giuseppe Pulighe – CREA Research Centre for Agricultural Policies and Bioeconomy
Date:	04-06-2021

1 Introduction

1.1 Background

This document provides the background for the testing activities within iteration in Italy, Case Study 1, Sulcis Region through the testing of A) Wheat for biogas scenario. The case study site is constituted by 5 municipalities, for a cumulated surface of 35,745 ha. The area is characterized by a Mediterranean semi-arid climate, the mean annual rainfall is about 600 mm and the mean annual temperature is 16° C. The study area is included in the Sulcis polluted "Site of National Interest" (SIN) that includes industrial and mining areas. In the past in this area have been performed some field trials with giant reed for evaluating potential yields on different agronomic conditions. A biogas CHP plant is present in the study area.

1.2 References

N/A

2 Overview

The Iteration in Case Study 1, Sulcis Region, Italy testing of A) Giant reed for biogas scenario for the testing of the WebGIS in the context of Task 4.2 of the BIOPLAT-EU project was begun on June 4st 2021 at 9:20 am and completed on June 4st 2021 at 11:00 am.

During this testing all sections of the WebGIS platform were considered in order to evaluate the computational capabilities and functionality on different scenarios.

The testing was conducted on a DELL OptiPlex Intel Core-i7 with 16Gbytes of memory running Microsoft Windows 10 Professional, a Wi-Fi broadband connection with results from speedtest.net of 12.78 Mbps in download and 0.92 Mbps in upload, Ping 112 ms. Browser used is Mozilla Firefox. In the machine was installed a Virtual Private Network.

Overall, the web-GIS platform worked very well, and no system crashes were experienced. At least 4 tests were performed, attempting different iterations on Underutilized Lands and

Contaminated Land (2 for low crop management, 2 for high crop management). For the test was selected the CHP biogas Bioenergy pathway as it is the one suggested by the Regional Environmental Energy Plan and guidelines for developing new bioenergy projects in Sardinia.

3 Variances

N/A

4 Assessment

Tests have been carried out modifying the section "Value Chain data Box", sub-section Crop Information (changing expected Yields, crop evapotranspiration and market price), the section Agronomic Information (changing amount of fertilization for nitrogen and phosphorus), as well as for the sub-section Transport of Feedstock because the distance calculated from BPS to BPP seems incorrect. In all cases the various iterations worked correctly. No changes have been made to the sub-section Bioenergy production (e.g. EU market price of bioenergy product) because this involves detailed knowledge of current market conditions. During the various iterations, the values proposed on the screen for the section "Income" (Operating inputs, Labour) have not been modified as they are considered constant or well defined.

5 Results

Test Case Study 1, Sulcis Region, Italy, A) Wheat for Biogas, was carried out successfully. The web application responded quickly to user input, the visualization at screen of the maps was clear, and the computation times quite fast. No differences were detected in the Layer Tab when selecting the Satellite Imagery vs the Sentinel set of images, making the latter apparently superfluous. The selection/deselection and consequent visualization in map of the various layers (i.e. contaminated, underutilized) is always very fast. Overall, the table of contents is very intuitive even for users not familiar with GIS or web-GIS platforms and data and visualization and on-screen display of themes or tables.

6 Evaluation

This section provides an overall evaluation of the testing process including problems and limitations.

The test Case Study 1, Sulcis Region, Italy, A) Wheat for Biogas, underwent comprehensive testing on multiple plots of contaminated and underutilized areas. Regarding the distance from BPS to BPP, we noticed that the localization of the CHP biogas plant in the map (near Carbonia city) is incorrect as it is located between the mountains, and a photointerpretation of the images clearly shows that there is no plant. Consequently, the displayed "Distance from BPS to BPP" was adjusted by inserting a shorter path, as a result, the distance to the BPP was changed by inserting a shorter path, therefore the STEN was simulated with this value. Overall, the values reported by STEN for Standard Indicators and Advanced Indicators seem correct and in line with the literature.

7 Summary of Activities

This section provides a summary of the major testing activities and events for the test performed for Case Study 1, Sulcis Region, Italy and A) Wheat for biogas.

Test Start Date: June 4st 2021, 9:20 am *Test End Date: June 4st 2021, 10:32 pm*

Item	**Planned**	**Actual**
Staff Levels	*1*	*1*
Test Design Effort	*1*	*1*
Test Execution Effort	*5*	*5*
Re-Test Effort	*1*	*1*
Overall test evaluation	*Positive*	*Positive*
Expected malfunctioning	*NO*	*YES*
Critical malfunctioning	*NO*	*NO*
Overall testing result accuracy	*Good*	*Good*
Inaccuracy attributable to:		*BPP plant in the study area*
Layers quality	*MUC lands: High* *Suitability: medium* *BPPs: Low*	*MUC lands: High* *Suitability: medium* *BPPs: Low*
Etc. feel free to add other summary categories as you see fit		*The location of th biogas CHP plants i the study area is no correct.*

Test Summary Report

Test Information	
Project ID:	BIOPLA-EU
Document Ref:	Case Study 2, Val Basento, Basilicata Region, Italy
Iteration ID:	A) Rapeseed for biodiesel; B) Sorghum for CHP biogas
Author:	Giuseppe Pulighe – CREA Research Centre for Agricultural Policies and Bioeconomy
Date:	04-06-2021

1 Introduction

1.1 Background

This document provides the background for the testing activities within iteration in Case Study 2, Val Basento, Basilicata Region, Italy through the testing of A) Repeseed for bioediesel scenario; B) Sorghum for CHP biogas scenario. The case study site includes the four municipalities of Ferrandina, Salandra, Garaguso and Pisticci in the "Val Basento industrial area", and six additional municipalities Matera, Montescaglioso, Miglionico, Pomarico and Grottole in the surrounding territory outside the industrial area. In this part of Italy, the study will consider a total surface of more than 4,000 hectares amongst contaminated (3,350 ha) and underutilized lands. Currently, agriculture and forestry are cornerstones of the regional economy. The study area is included in the list of "Site of National Interest" (SIN) areas. There is no detailed information on field trials of specific crops. In the study area there is an important biorefinery plant established in Ferrandina (Matera province), and some biogas CHP plant.

1.2 References

N/A

2 Overview

The Iteration in Case Study 2, Val Basento, Basilicata Region, Italy, testing of A) Rapeseed for biodiesel scenario for the testing of the WebGIS in the context of Task 4.2 of the BIOPLAT-EU project was begun on June 4st 2021 at 3:02 pm and completed on June 4st 2021 at 4:20 pm.

During this testing all sections of the WebGIS platform were considered in order to evaluate the computational capabilities and functionality on different scenarios.

The testing was conducted on a DELL OptiPlex Intel Core-i7 with 16Gbytes of memory running Microsoft Windows 10 Professional, a Wi-Fi broadband connection with results from speedtest.net of 12.78 Mbps in download and 0.92 Mbps in upload, Ping 112 ms. Browser used is Mozilla Firefox. In the machine was installed a Virtual Private Network.

Overall, the web-GIS platform worked very well, and no system crashes were experienced. At least 4 tests were performed, attempting different iterations on Underutilized Lands and Contaminated Land. For 2 tests was selected the biodiesel Bioenergy pathway as it is the one

of the most promising considering the presence of the Greenswitch biorefinery plant in the study area. Two tests have been carried out for the biogas CHP Bioenergy Pathway, considering the presence of some plants in the area.

3 Variances

N/A

4 Assessment

This section provides a brief assessment of the comprehensiveness of the testing process for the completed testing phase against the test objectives and constraints specified in the Grant Agreement. Tests have been carried out modifying the section "Value Chain data Box", sub-section Crop Information (changing expected Yields, crop evapotranspiration and market price), the section Agronomic Information (changing amount of fertilization for nitrogen and phosphorus). In all cases the various iterations worked correctly. No changes have been made to the sub-section Bioenergy production (e.g. EU market price of bioenergy product) because this involves detailed knowledge of current market conditions. During the various iterations, the values proposed on the screen for the section "Income" (Operating inputs, Labour) have not been modified as they are considered constant or well defined.

5 Results

Test Case Study 2, Val Basento, Basilicata Region, Italy, A) Rapeseed for biodiesel; B) Sorghum for CHP biogas was carried out successfully. The web application responded quickly to user input, the visualization at screen of the maps was clear, and the computation times quite fast. No differences were detected in the Layer Tab when selecting the Satellite Imagery vs the Sentinel set of images, making the latter apparently superfluous. The selection/deselection and consequent visualization in map of the various layers (i.e. contaminated, underutilized) is always very fast. Overall, the table of contents is very intuitive even for users not familiar with GIS or web-GIS platforms and data and visualization and on-screen display of themes or tables.

6 Evaluation

This section provides an overall evaluation of the testing process including problems and limitations.

The test Case Study 2, Val Basento, Basilicata Region, Italy A) Rapeseed for biodiesel, underwent comprehensive testing on multiple plots of contaminated and underutilized areas.

The test Case Study 2, Val Basento, Basilicata Region, Italy B) Sorghum for CHP biogas, underwent comprehensive testing on multiple plots of contaminated and underutilized areas.

Overall, the values reported by STEN for Standard Indicators and Advanced Indicators seem correct and in line with the literature.

7 Summary of Activities

This section provides a summary of the major testing activities and events for the test performed for each Case Study 2, Val Basento, Basilicata Region, Italy and A) Rapeseed for biodiesel; B) Sorghum for CHP biogas. This section also summarises testing resource information, such as total staffing levels (how many people performed the *same* test), total testing time, characteristics, etc etc.

Test Start Date: June 4st 2021, 3:02 pm *Test End Date: June 4st 2021, @ 4:20 pm*

Item	**Planned**	**Actual**
Staff Levels	*1*	*1*
Test Design Effort	*1*	*2*
Test Execution Effort	*2 each*	*4 each*
Re-Test Effort	*1*	*2*
Overall test evaluation	*Positive*	*Positive*
Expected malfunctioning	*NO*	*No*
Critical malfunctioning	*NO*	*NO*
Overall testing result accuracy	*Good*	*Good*
Inaccuracy attributable to:	*Data*	*Data*
Layers quality	*MUC lands: High* *Suitability: High* *BPPs: High*	*MUC lands: High* *Suitability: High* *BPPs: High*
Etc. feel free to add other summary categories as you see fit		

3.4 Romania

STEN TOOL TEST- Summary Report

Test Information	
Project ID:	BIOPLAT-EU
Document Ref:	**Romania, Case Study 1, Bacau region**
Iteration ID:	**Sorghum for CHP -biogas**
Author:	Cristian Tantareanu ENERO
Date:	2nd June 2021

1 Introduction

This document provides information and results for the testing activities of the WEBGIS platform and STEN tool developed within the BIOPLAT-eu project. The iteration purpose is the Romania, Case Study 1, Bacau region through the testing of Sorghum for CHP- biogas scenario.

The TIER-2 analyze identified two communes with large underutilized areas which consequently were pre-selected for the case study: Blăgești and Strugari.

The selected plot for the case study is partially within the Blăgești commune territory, some 30 ha, while other 60 ha are within the Buhuși city administrative limits. Previously the site was in fact a lake, the Racova lake, part of the Bistrița river hydrographic course. The lake was step by step silted up with alluviums, the Bistrita river course was regulated and the former lake become a dry land covered by spontaneous vegetation.

The test was performed for this underutilized parcel labelled RO21120778RO00007485, which may be found to the South-East of Buhusi municipality. The terrain has a total surface of 91.89 ha,

There is no operating BPP at a close distance from the selected plot. In Bacau County there are several pellets and briquettes small capacity manufacturers. A BPP CHP solid biomass is 75 km far, in Pangarati commune.

2 Overview

2.1 General info

The Iteration Romania, Case Study 1, Bacau region through the testing of Sorghum for CHP- biogas scenario with the STEN tool in the context of Task 4.2 of the BIOPLAT-EU project begun on 30 May 2021. The work was performed with intermittency for a cumulated duration of approx. 15 man* hours and was completed on 2nd June 2021.

During this testing the following sections of the WebGIS platform were considered:

- Layers menu,
- STEN tool,
- Info Panels,
- Value Chain Data Box,
- Advanced Indicators,
- Results panel.

On the Value Chain Data Box and Results panel the focus was given to **Energy related data**, as the key data leading to the definition of the prefeasibility study approached in WP6 of the Bioplat project.

The testing was conducted on a Sony VAIO Laptop with 32Gbytes of memory running Microsoft Windows 10 Professional, a Wi-Fi broadband connection. Browser used is Google Chrome.

2.2 Feedback on the general characteristics of the tool

- The automatic Romanian translation of the text is confusing and need to be improved. We are ready to do it.

- To arrive to a particular MUC plot which a user has already previously selected and worked on, one should search again from the beginning the map by name of municipality in the area, identify visually the plot and select it. There is no way to go directly to the plot using its name/label or other identifier.

- Several indicators are not explained as definition, meaning, relevance:

    - What relevance has the indicator *MJ of co-products / MJ of bioenergy production ?*
    - In page Value chain Data Box/Crop information:
        - *Bioenergy crop ET ?*
    - In page Value Chain Data Box/Bioenergy Production:
        - *MJ of Bioenergy product(s) /MJ FSTK* indicator should appear 55% or 0.55, not 0.55 %
        - Idem *MJ of co product(s)…*
        - *MJ of energy input per unit of feedstock processed* sems to be the specific energy to obtain the biogas. Why is Not a Number (NaN)?

    - In page RESULTS/NET ENERGY BALANCE
        - It looks that the following change in the arrangement is needed

	91.89 ha	cu crop 6.97		
Energy efficiency of the value chain				
Unit	Parameter	Cultivation	Processing	Value Chain
MJ/ton FSTK	TFI	726.29	0	
MJ/ton FSTK	TFO	16,240.00	8,932.00	
MJ/ton FSTK	Net Energy Value	15,513.71	22.36	
Ratio	Net Energy Ratio	8,932.00	N/A	11.63

- How is defined/calculated the Net energy ratio of the Value chain? It can't be reconstituted its calculation.

2.3 How the model works with respect to the quality of the inserted data.

A first test was to change manually the *crop yield*

- the indicator *Total Feedstock prod* followed correctly the change
- the indicator *Final bioenergy prod* remained unchanged
  In my particular case I changed the crop from 6.97 to 14 t/ha but the *Final bioenergy prod.* remained 5721 GJ instead to change to cca 11491 GJ
- In page RESULTS/NET ENERGY BALANCE, *TFI Cultivation* indicator changed correctly inversely proportional to the crop yield
- Idem for *Net Energy Value for Processing*

Another test was to compare output data for two parcels in identical agronomic and geographic conditions but with different areas. For this purpose

- one parcel was the initial parcel sized 91.89 ha
- the second parcel was a parcel built inside the above parcel, sized 29.85
- the ratio between the sizes is 0.32 (or 3.08)

There were analysed the resulted indicators for both parcels, looking for the logical ratio between them of either 1:1 (for the specific indicators) or close to 3.08.
Again the final energy prod. remained unchanged (expected to be in ratio close 3.08).
The rest of the results were in the logical ratio.

3 Variances- Default input data versus other data, including local/national experience

The main variance regards the **crop yield value.**

The default data of 6.97 t DM/ha for the collected sorghum (the whole plant, not only the grains) seems low for the local conditions.

In general, the sorghum DM yield goes up to 25…30 tonnes/ha on normal soils.

In Italy the "Average grain sorghum yields stand at 6,5-7 tons per hectare. As to silage sorghum, it is grown on a much wider area: in Lombardy, in southern Italy, in the Piedmont, Veneto, and Emilia-Romagna. Yields vary much more than those of grain sorghum, going from 35 tons per hectare (Sudan grass varieties) to 80 tons per hectare (*bicolour* varieties), and 30 percent dry matter[1].

[1] https://www.sorghum-id.com/en/sorghum-in-italy-now-a-major-crop/

In Romania a document of the Ministry of Agriculture (Order 864 dated 2013) states the list of crops for energy purposes, mentioning the estimated yield as DM (see table below)[2]

Nr. crt.	Popular name	Scientific name	Estimated yield as DM t/ha
1.	Rape	*Brassica carinata*	12-14
2.	Corn	*Zea mays*	22-30
3.	Sweet Sorghum	*Sorghum saccharatum*	22-35
4.	Sudan Sorghum	*Sorghum sudanense*	25-30

Other refernces are:

„Dry matter (DM) biomass yield ranged between 15.7 and 20.67 t ha−1 when sorghum was grown as main crop. The variety SOR 4 achieved a methane yield of 6500 m3 ha−1“ Wannasek at al, 2017[3]

The experience of a Romanian farmer with a sorghum crop for biogas shows a yield of 58 tonne/ha silage sorghum, probably green harvest, which may be translated in approx. 18 tonnes/ ha DM[4.]

A comprehensive study in Poland [5] gives the information „The average sorghum DM yields ranged from 10.5 for non-fertilized SuperSile 20 to 23.6 Mg ha□1 for Sucrosorgo 506 fertilized with sewage sludge”.

A German study of the Agricultural technological Center Augustenberg gives, next to other useful information, the Sorghum yield for bioenergy purposes in the range of 11 to 19 DM t/ha[6]

Also other studies were consulted regarding the sorghum yield [7].

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[2] https://lege5.ro/gratuit/gmytgmrqgy/lista-culturilor-energetice-destinate-productiei-de-biomasa-utilizata-in-scopul-producerii-energiei-electrice-procedura?dp=gyydomzvheyts

[3] https://www.sciencedirect.com/science/article/abs/pii/S0961953417302830?via%3Dihub

[4] https://agrointel.ro/5462/tufa-din-care-se-fac-maturile-mai-foloseste-la-biogaz-sau-ca-furaj-si-aduce-profit-pe-timp-de-seceta/

[5] Lilianna Głab et al., Sustainable Production of Sweet Sorghum as a Bioenergy Crop Using Biosolids Taking into Account Greenhouse Gas Emissions, 2019

[6] Landwirtschaftliches Technologiezentrum Augustenberg, Sorghumhirsen zur Biogasnutzung als Alternative bzw. Ergänzung zum Energiemaisanbau , 2012

[7] Andrea Salimbeni Sweet Sorghum Biogas Plant In Temperate Regions (Belgium) - Demonstration Plant. For Biogas And High Value Biofertilizer Production, 21st European Biomass Conference and Exhibition, 3-7 June 2013, Copenhagen, Denmark

In conclusion we suggest to consider as a realistic and conservate yield indicator for our case study the value 14 tDM/ha.

Another verified relevant indicator was the efficiency of the energy conversion from sorghum biomass to biogas energy carrier. Here the default data is **55%,** meaning an indicator of **aprox 0.42 thousand cubic meters biogas/ tonne sorghum feedstock**, or with the previous assumption on yield, an indicator of **5.82 thousand cubic meters biogas/ha.**

These indicators are in line with data known from literature, in Romania[8] or elsewhere[9] so a 55% conversion efficiency indicator is appropriate.

4 Assessment

Several scenarios have been tested in order to test the accuracy of the tool and its versatility. The most important test tool was the use of manually introduced data and observing the platform outputs.

Another work was related to recompose in a simple Excel file the calculation and relation between some energy related parameters in order to verify the STEN results

We should mention that a number of STEN parameters were not yet verified versus the local conditions (as Employment or Advanced Indicators), but these parameters are not considered to critical differ from the default data and to significantly influence the main output of STEN tool, the biogas production which should be translated as input data to the prefeasibility model of a biogas CHP. Nevertheless, also these parameters will be checked in due time.

5 Results

The model works friendly and offer good combinatorial effects and variants to assess and to find an appropriate way for the utilisation of a marginal land

No failure or delays were detected during the software execution

There still may be found some inadvertences and not yet introduced clarifications in the presentation text.

In the specific sorghum crops Romanian case, the main in discussion variance regards the crop yield, which was documented to be significantly higher versus the default data.

6. Summary of Activities

The major testing activities, resources and events for the test performed for Romania, Case Study 1, Bacau region were:

[8] https://www.businessagricol.ro/sorgul-cultura-viitorului/

[9] Maendy Fritz, Biogas Production with Sorghum Biomass, 1st European Sorghum Congress, Bucharest 2016

- staff involved 2
- type of work: intensive
- cumulated duration of STEN tests 15 man*hours
- cumulated duration of documentary research 25 man*hours
- number of STEN software initiations/executions: approx. 40
- participation to an online training meeting 31st May 2021: 4 man*hours
- exchange of information within the Bioplat project team (emails)
- overall test evaluation to advance versus WP6 works: positive
- overall degree of STEN manipulation knowledge obtained; 7/10

STEN TOOL TEST- Summary Report

Test Information	
Project ID:	BIOPLAT-EU
Document Ref:	**Romania, Case Study 2, Gorj region**
Iteration ID:	**Miscanthus for CHP- solid biomass**
Author:	Cristian Tantareanu, ENERO
Date:	4th June 2021

1 Introduction

This document provides information and results for the testing activities of the WEBGIS platform and STEN tool developed within the BIOPLAT-EU project. The iteration purpose is the Romania, Case Study 2, Gorj region through the testing of Miscanthus for CHP- solid biomass scenario.

The Gorj region is a lignite mining area with numerous carriers. Part of these carriers are already closed and large closed spoil heaps remain available for other uses. Pesteana North spoil heap is one of these terrains and it was chosen as application for an energy crop within one of the Romanian case studies.

Pesteana North land has a total surface of 151 ha,

There is no operating BPP at a reasonable distance from the selected plot. In Gorj County there are only some pellets and briquettes small capacity manufacturers (e.g. in Balanesti and Telesti).

The user of the Pesteana site is now the Energy Complex Oltenia (Complexul Energetic Oltenia - CEO), but the ownership situation in not clarified between CEO, municipalities and local private farmers. For the same reason the cadaster registration is not performed yet, but probably this will be clarified in the next future.

There were also some minor local experiments to use former mining terrains in the area. Thus in 2011, plantations were carried out on 1 ha with Miscanthus on the Rovinari spoil heap. This experiment showed that Miscanthus has a good suitability to be used on such terrains, with a good production. Therefore, there is some local knowledge on Miscanthus crops but the crops were not developed on large scale and not yet used for energy purposes.

2 Overview

2.1 General info

The Iteration Romania, Case Study 2, Gorj region through the testing of Miscanthus for CHP- solid scenario with the STEN tool in the context of Task 4.2 of the BIOPLAT-EU project begun on 31 May

2021. The work was performed with intermittency for a cumulated duration of approx. 15 man* hours and was completed on 4th June 2021.

During this testing the following sections of the WebGIS platform (https://webgis.bioplat.eu/#/map) were considered:

- Layers menu,
- STEN tool,
- Info Panels,
- Value Chain Data Box,
- Advanced Indicators,
- Results panel.

On the Value Chain Data Box and Results panel, the focus was given to **Energy related data**, as being the key data leading to the definition of the CHP prefeasibility study approached in WP6 of the BIOPLAT project.

The testing was conducted on a Sony VAIO Laptop with 32Gbytes of memory running Microsoft Windows 10 Professional, a Wi-Fi broadband connection. Browser used is Google Chrome.

2.2 Feedback on the general characteristics of the tool

See the Test report Romanian case study 1.

2.3 How the model works with respect to the quality of the inserted data.

See the Test report Romanian case study 1.

3 Variances- Default input data versus other data, including local/national experience

We focussed on the most influencing parameters on the final bioenergy production

- the crop yield.
- the efficiency of the technological conversion from the energy contained in biomass to the final bioenergy product.

The crop yield

The crop yield and the suitability indicator in the STEN tool rely on the usual soil conditions in the area, as described by JRC and GAEZ data.

The selected parcel for the case study 2 in Romania is a closed lignite mine spoil heap, therefore a specific soil, not the geographical area standard soil. Therefore, the STEN default suitability indicator and crop yield should be researched for this specific case and consider specific data known for the miscanthus crops on former mining areas.

The default data of 0.99 t DM/ha for the yearly collected miscanthus is too low versus real experiments performed in Romania and elsewhere.

Growing Miscanthus on former mines spoil heaps has been investigated since about 20 years ago and several information on the crop yield is available.
In general, the Miscanthus DM yield is 15…30 tonnes/ha on normal soils.
E.g., in Romania, a document of the Romanian Ministry of Agriculture (Order 864 dated 2013) states the list of crops for energy purposes, mentioning the estimated yield as DM (see table below)[10]

Nr. crt.	Popular name	Scientific name	Estimated yield as DM t/ha
1.	Rape	*Brassica carinata*	12-14
2.	Corn	*Zea mays*	22-30
3.	Sweet Sorghum	*Sorghum saccharatum*	22-35
4.	Sudan Sorghum	*Sorghum sudanense*	25-30
5	Willow for biomass	*Salix*	15-18
6	**Elephant grass**	***Miscanthus spp.***	**12-18**

In Romania there were planted with Miscanthus two pilot parcels: in 2011 an area of 0.5 ha on the Rovinari carrier spoil heap[11] and in the year 2014 an area of 10 ha on the Negomir spoil heap of the Pinoasa carrier. Both lands are within the same lignite mining area with the Pesteana land.

Other experiments on growing Miscanthus on former mining lands showed that miscanthus yield potentials were 2.6 (0.8−5.53), 10.0 (1.3−16.0), and 16.0 (1.34−26.0) Mg ha−1 with fertilizer application rates of 0, 100, and 200 kg-N ha−1, respectively.[12]

In Ukraine, the yield of dry above-ground biomass ranged from 4.3 to 6.8 t DM ha^{-1} after the first year of cultivation and from 8.9 to 9.7 t DM ha^{-1} after the second year while using these substrates. [13]

[10] https://lege5.ro/gratuit/gmytgmrqgy/lista-culturilor-energetice-destinate-productiei-de-biomasa-utilizata-in-scopul-producerii-energiei-electrice-procedura?dp=gyydomzvheyts

[11] Research Institute for Agriculture and Forests-ICAS Brasov, 2012

[12] Kamalakanta Sahoo et a., Assessment of Miscanthus Yield Potential from Strip-Mined Lands (SML) and Its Impacts on Stream Water Quality, 2019, https://www.mdpi.com/2073-4441/11/3/546

[13] Mykola Kharytonov et al, The estimation of *Miscanthus×giganteus*' adaptive potential for cultivation on the mining and post-mining lands in Ukraine, 2018, Environmental Science and Pollution Research 26,

The calculated yield of Miscanthus in Brandenburg, Germany former mine soil is 13.5 tM/ha/year[14].

Also, other studies were consulted regarding the miscanthus yield [15],[16],[17].

In conclusion we suggest to consider as a realistic and conservative yield indicator for our case study the values

- **First year** **1.5 tDM/ha**
- **Second year** **3 tDM/ha**
- **Third year and followings** **9 tDM/ha.**

A harvest of 9 tDM/ha/year gives a final energy product of approx. 3,400 GJ (electricity)/year.

The efficiency of the technological conversion
This parameter synthesises the quality of the technologies used along the biomass value chain.
The STEN default parameter for this value chain, Mischantus-solid-CHP, is 15%, linking the energy contained in the Miscanthus crop to the final energy product.

The STEN tool should define and clarify better what is the final energy product for each chain. In the present biomass chain, STEN indicates that the final energy product is the electrical output of the CHP. The 15% efficiency is in fact the efficiency of the power generation station.

There is a need to have a similar approach about the final energy product and the biomass chain efficiency for all chains ending with CHPs because in the present case the CHP is included in the chain, while in the chain Sorghum-biogas-CHP, (applied in the Romania case study 1) the CHP is not included in the chain (the final energy product is the biogas, not the electrical output).

Another issue worth to be addressed is whether the heat generation of a CHP should enter as a final energy product, next to the power generation.

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http://search.proquest.com/openview/af99eab621dec2ee412666bbd2170fd7/1?pq-origsite=gscholar&cbl=54208

[14] Ehsan Tavakoli-Hashjini, Potential Bioenergy Production from Miscanthus × giganteus in Brandenburg: Producing Bioenergy and Fostering Other Ecosystem Services while Ensuring Food Self-Sufficiency in the Berlin-Brandenburg Region, 2020, https://www.mdpi.com/2071-1050/12/18/7731/pdf

[15] Milica Peric, Life Cycle Impact Assessment of Miscanthus Crop for Sustainable Household Heating in Serbia, 2018

[16] Establishment, Growth, and Yield Potential of the Perennial Grass *Miscanthus × Giganteus* on Degraded Coal Mine Soils, Stanisław Jeżowski[1†],2017 https://www.frontiersin.org/articles/10.3389/fpls.2017.00726/full

[17] IRENA, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Jan/IRENA_Solid_biomass_supply_2019.pdf

Regarding the efficiency parameter, there is a large game of values for the efficiency of small-scale biomass CHPs, depending on the technology (steam engine, steam turbine, ORC etc). It ranges from 8 % to 28% [18]

The considered **15%** default value (which includes some biomass raw material losses) is a correct and conservative approach.

4 Assessment

Several scenarios have been tested in order to test the accuracy of the tool and its versatility. The most important test tool was the use of manually introduced data and observing the platform outputs.

Another work was related to recompose in a simple Excel file the calculation and relation between some energy related parameters in order to verify the STEN results

We should mention that a number of STEN parameters were not yet verified versus the local conditions (as Employment or Advanced Indicators), but these parameters are not considered to critical differ from the default data and to significantly influence the main output of STEN tool, the solid biomass production which should be translated as input data to the prefeasibility model of a CHP fuelled by this biomass. Nevertheless, also these parameters will be checked in due time.

5 Results

The model works friendly and offer good combinatorial effects and variants to asses and to find an appropriate way for the utilisation of a marginal land

No failure or delays were detected during the software execution

There still may be found some inadvertences and not yet introduced clarifications in the presentation text.

In the specific Miscanthus crops Romanian case, the main in discussion variance regards the crop yield, which was documented to be significantly higher versus the default data.

6 Summary of Activities

The major testing activities, resources and events for the test performed for Romania, Case Study 2, Gorj region were:

- staff involved 2
- type of work: intensive
- cumulated duration of STEN tests 12 man*hours
- cumulated duration of documentary research 20 man*hours

[18] Best practise report on decentralized biomass fired CHP plants and status of biomass fired small- and micro scale CHP technologies, IEA Bioenergy report, 2019, https://www.ieabioenergy.com/wp-content/uploads/2019/05/T32_CHP_Report_01_2019.pdf

- number of STEN software initiations/executions: approx. 30
- participation to an online training meeting 31st May 2021:
- exchange of information within the BIOPLAT project team (emails)
- overall test evaluation to advance versus WP6 works: positive
- overall degree of STEN manipulation knowledge obtained; 7/10

3.5 Ukraine

Test Summary Report

Test Information	
Project ID:	BIOPLAT-EU
Document Ref:	<Ukraine, Case Study 1, Khmelnytsky and Ternopil regions>
Iteration ID:	<Miscanthus for CHP- solid biomass>
Author:	*<Oleksandra Tryboi, SECB>*
Date:	<04.06.2021>

1 Introduction

1.1 Background

This document provides the background for the testing activities within iteration < Ukraine, Case Study 1, Khmelnytsky and Ternopil region > through the testing of <Miscanthus for CHP- solid biomass> scenario.

Location: Khmelnytsky and Ternopil regions; MUC land status: Underutilized; BPS Approx. surface:> 30,000 ha. The BPP is planned at the site with Google map coordinates: 49°31'04.2"N 27°07'03.5"E (near Khmelnytsky city).

Several bioenergy facilities are located in a 100 km radius from the 1st Case study site. The 10.5 MWel biogas plant of the Theophipol Energy Company LLC is located at 80 km distance from the Case study site. The predominant feedstock used in the plant is agricultural residues. The plant generates electricity that is sold at a “green” tariff (EUR 123.9 per MWh according to the Law of Ukraine No. 555-IV on Alternative Energy Sources with amendments from 09.08.201962, set in October 2017). Within the same radius there is also a bioethanol plant at Teofiopolskyi sugar plant (capacity: 25,000 t/year) and a vegetable oil extraction plant located in Starokostiantyniv (capacity 1000 thousand tons of oil/year). A CHP plant fueled with wood chips that has a capacity of 1.8 MWel is located at 118 km from the borders of the 1st Case study site.

Miscanthus is considered as a crop for the 1 Case Study Site in Ukraine. During the testing it was noticed that according to Crops Suitability map yield for this area is 0.65 t/ha. According to field trials conducted in 2012-2016 at the Forest-Steppe zone in Vinnytsia region (borders with Khmelnytsky region at the east) Miscanthus yield in the third year of vegetation was 25.3 dry t/ha. http://www.agricultforest.ac.me/data/20180629-10%20Gumentyk.pdf

1.2 References

Gumentyk, M., Kharytonov, M. (2018): Development and assessment of technologies of miscanthus and switchgrass growing in forest-steppe zone of Ukraine. Agriculture and Forestry, 64 (2): 137-146. DOI:10.17707/AgricultForest.64.2.10

http://www.agricultforest.ac.me/data/20180629-10%20Gumentyk.pdf

2 Overview

The Iteration <Ukraine, Case Study 1, Khmelnytsky and Ternopil regions> <Miscanthus for CHP- solid biomass> scenario for the testing of the WebGIS in the context of Task 4.2 of the BIOPLAT-EU project was begun on June 4th 2021 at 10:53 am and completed on June 4th 2021 at 5:55 pm. During this testing only the following sections of the WebGIS platform were considered: Layers menu, STEN tool, Info Panels, Value Chain Data Box, Advanced Indicators, Results panel.

The testing was conducted on an Acer Aspire 5 notebook with 8Gbytes of memory running Microsoft Windows 10 Pro, a WiFi broadband connection with results from speedtest.net of 207 Mb/s in download and 221 Mb/s in upload. Browser used is Google Chrome.

The testing was performed for Miscanthus to CHP-solid biomass 3 times. During the testing it was noticed that Crop Suitability map finally provides very small yield of 0.65 t/ha. Crop information for Yield was changed several times according to literature information with results of field trials in Ukraine (14.8 t/ha and 15.58 t/ha). Finally, the yield was changed to 25.3 t/ha, as the results of field trials were found not only for the same zone (Forest-Steppe), but also in the neighbouring region (Vinnytsia).

The Location of BPP was changed manually according to the known coordinates of the future site location. But, in the first iteration the other random location was set.

3 Variances

Section of the Value Chain Data Box	Item	Default value	Own value	Description
Target Area	Permanent crops	28,964.00 ha	N/A	The total area of the Lisovogrynivetska community is 25,798.6 ha according to the official portal of the community https://lisovogrynivecka-rada.gov.ua/
	Population	2,519,180	8503	The population on 01/01/2015 according to the https://lisovogrynivecka-rada.gov.ua/

	GDP	12.776.400.000 EUR		Default value is incorrect for the Target area. Data is available only at a regional level in Ukrainian http://www.ukrstat.gov.ua/druk/publicat/kat_u/2021/zb/04/zb_vrp_2019.pdf
Crop Information	Yield	0.65	25.3	According to field trials conducted in 2012-2016 at the Forest-Steppe zone in Vinnytsia region (borders with Khmelnytsky region at the east) Miscanthus yield in the third year of vegetation was 25.3 dry t/ha. http://www.agricultforest.ac.me/data/20180629-10%20Gumentyk.pdf
	Market price	100 EUR/t	27-75 EUR/t	Market price can vary, but according to an offer on April 7, 2021, price is 2500 UAH (~75 EUR/t) https://agro-ukraine.com/ua/trade/m-1103978/miskantus-giganteus-miskantus-shhepa-tirsa/

4 Assessment

The testing covered the following steps:

- Choice of the Layers (Underutilized Land, Bioenergy Processing Plants layers were selected)

- Choice of the Underutilized land plot (manually on the map the land plot was found and then selected using right side menu inder “i” button).

- Work in the “Define Target Area” box:

  - Choice of Miscanthus, using a drop-down menu;
  - Choice of Bioenergy Pathway (CHP solid biomass);
  - Choice of the BPP location (manually on the map). Bing Aerial Layer was chosen to choose the location, as it was not identified how to choose the plot by known coordinates.

- Work with “Value Chain Data Box”:

  - It was notice that in the “Target Area” section for “Number of PERMANENT jobs positions” and Number of TEMPORARY job positions there was NaN that maybe is an error.
  - In the Target Area section default data is not correct.

- In the Crop Information section data for yield was changed from 0.65 T/ha to 25.3 T/ha. Market Price was changed to 27 EUR/ton. Title “Bioenergy Crop ET” is unclear and needs clarification.
- In the Bioenergy Production section for “MJ of Bioenergy products/ MJ FDSTK” it is indicated 0.15%. Although it is meant 15%, but not 0.15%. The same is for “MJ of co-products / MJ of bioenergy production” – 0.30% (should be 30%). Also, for “MJ of energy input per unit of feedstock processed” the value is NaN.00 MJ/ton that may be an error.

In general, the webGIS testing went well. The system is user-friendly and works fast with the users inputs. Some default values need to be checked or there should be indicated that the value is given for reference and doesn’t refer to this particular case.

5 Results

Test Case Case Study 1, Ukraine, Miscanthus for CHP (solid biomass), was carried out without crashes. The web application responded swiftly to user’s inputs. Quick Help button in the upper menu and “**?**” button in the right side menu work but the opened box doesn’t contain any information. Geo location button of the right side menu doesn’t work. The language choice of Ukrainian gives a tricky translation of certain complex terms. Borders of municipalities are not correct and need to be updated. Also, default values of the Value Chain Data Box (Target Area, Crop Information) need to be updated.

Testing of the Advanced Indicators INCOME and ENERGY ACCESS was not conducted due to lack of time.

6 Evaluation

This section provides an overall evaluation of the testing process including problems and limitations.

The Case study 1, Ukraine, Miscanthus for CHP (solid biomass) underwent comprehensive testing, with the following defects being observed:

Work with “Value Chain Data Box”:

- It was noticed that in the “Target Area” section for “Number of PERMANENT jobs positions” and Number of TEMPORARY job positions there was NaN that maybe is an error.
- In the Target Area section default data is not correct.
- In the Crop Information section data for yield was changed from 0.65 T/ha to 25.3 T/ha. Market Price was changed to 27 EUR/ton. Title “Bioenergy Crop ET” is unclear and needs clarification.
- In the Bioenergy Production section for “MJ of Bioenergy products/ MJ FDSTK” it is indicated 0.15%. Although it is meant 15%, but not 0.15%. The same is for “MJ of co-products / MJ of bioenergy production” – 0.30% (should be 30%). Also, for “MJ of energy input per unit of feedstock processed” the value is NaN.00 MJ/ton that may be an error.

7 Summary of Activities

This section provides a summary of the major testing activities and events for the test performed for each <Ukraine, Case Study 1, Khmelnytsky and Ternopil regions> and <Miscanthus for CHP- solid biomass>. This section also summarises testing resource information, such as total staffing levels (how many people performed the *same* test), total testing time, characteristics.

Test Start Date: June 4th 2021, @10:43 pm *Test End Date: June 4th 2021, @ 5:55 pm*

Item	**Planned**	**Actual**
Staff Levels	*2*	*1*
Test Design Effort	*1*	*2*
Test Execution Effort	*2 each*	*3 each*
Re-Test Effort	*1*	*3*
Overall test evaluation	*Positive*	*Positive*
Expected malfunctioning	*NO*	*YES*
Critical malfunctioning	*NO*	*NO*
Overall testing result accuracy	*Good*	*Fair*
Inaccuracy attributable to:	*Data*	*Borders of Municipalities, Ukrainian translation; Default values*
Layers quality	*MUC lands: High Suitability: High BPPs: Medium*	*MUC lands: High Crop Suitability: Low BPPs: High Administrative limits: Low*

Test Summary Report

Test Information	
Project ID:	BIOPLAT-EU
Document Ref:	Ukraine, Case Study 2, Kyiv/Chernihiv region
Iteration ID:	Switchgrass for 2G ethanol
Author:	Olha Haidai, SEC Biomass
Date:	03.06.2021

1 Introduction

1.1 Background

This document provides the background for the testing activities within iteration <Ukraine, Case Study 2, Kyiv and Chernihiv region> through the testing of <Switchgrass for 2G ethanol> scenario.

To differ from the scenario of the Case study 1 (solid biomass for CHP) it was decided to test other perspective value chain for Ukraine that based on solid biomass (willow or switchgrass) growing with further 2G ethanol production.

Location: Kyiv and Chernihiv regions; MUC land status: Underutilized; BPS Approx. surface:> 40,000 ha. As hypothetical scenario, BPP is considered to be placed at Slavutych city (the same location with the CHP plant on willow chips that described in D4.1).

The willow considered being a crop for Case study 2 in Ukraine, but during the tool` testing, it was noticed that there are no willow suitability map for Ukraine within the tool, so it is decided to test Switchgrass to 2G ethanol scenario.

Poltava state agrarian academy filed trials conducted during 2015-2019 shown the yield of switchgrass at the average level of 14.4 t/ha. The field trials was conducted at the region that is located at the same climatic zone as case study area (Polissia), so the before mentioned value was used during the stimulation.

1.2 References

Efficiency of optimized technology of switchgrass biomass production for biofuel processing. M Kulyk, V Kurilo, N Pryshliak, V Pryshliak. Journal of Environmental Management and Tourism.-2020.-V. 11, n. 1.-P. 173-185. http://socrates.vsau.org/repository/getfile.php/24675.pdf

2 Overview

The Iteration <Ukraine, Case Study 2, Kyiv/Chernihiv region> <Switchgrass for 2G ethanol> scenario for the testing of the WebGIS in the context of Task 4.2 of the BIOPLAT-EU project was begun on June 3rd 2021 at 3:10 pm and completed on June 3rd 2021 at 3:40 pm. During this testing only the following sections of the WebGIS platform were considered: Layers menu, STEN tool, Info Panels, Value Chain Data Box, Advanced Indicators and Results panel.

The testing was conducted on an HP Pavilion Notebook with 6Gbytes of memory running Microsoft Windows 10 Home, a Wi-Fi broadband connection with results from speedtest.net of 40.09 Mb/s in download and 71.81 Mb/s in upload. Browser used is Google Chrome.

Permanently, the value chain of the Chernihiv case study should present the <Willow for 2G ethanol> scenario. However, the suitability map for willow does not cover the Ukraine, so the crop was replaced by switchgrass. Then the crop yield was changes to a value for Polissia region in Ukraine that is 14.4 t/ha. Also manually the location of BPP was changed from the nearest one located at Finland to the hypothetical plant that could be located within the city of Slavutych (according to the D4.1).

After the accepting of the data within STEN tool in was noticed that target area of the value chain was not identified despite the fact that administrative limits layer shows the data on municipalities. The fields within “target area” data box were empty.

When changing the MUC land and BPP location to the other random items the Target area data box was filled with data, so it was noticed that the problem appears only with firstly selected combination of MUC land and BPP location.

3 Variances

This section is used to record any variances of the artefacts from those areas agreed on previously, especially in areas that may cause concern to FAO, UCLM and JR evaluating the test results, including any references to supporting documentation that covers the reasons for the deviations (e.g. data, processes, etc.). To this end, remember for instance that GHG emissions in processing stages are calculated as blackbox values starting from information from BioGrace (www.biograce.net). In case for the specific testing you have literature that differs significantly from default values, please include both results (default values + own values) and provide a critical description of these variances.

4 Assessment

The testing of the various characteristics of the tool was done following the next steps:

- working with layers (changing the map view, selection/unselecting of layers);
- looking for the case study area by using the “search for a place” field;
- selection of the underutilized land within the case study region (random);
- working with the STEN tool data box: selection of crop and bioenergy pathway, correction of the bioenergy processing plant location;
- working with the advanced indicator “value chain data box”: changing of the crop yield indicator.

Unfortunately, it was not possible to test the Advanced Indicators INCOME and ENERGY ACCESS due to lack of primary data on 2G ethanol production from switchgrass under Ukrainian conditions.

In general the system testing considered to be user friendly, fast working with the user inputs (despite low performance characteristics of the notebook), and the tool interface is intuitively clear.

5 Results

Test Case Study 2, Ukraine, Switchgrass for 2G ethanol, was carried out with great ease. The web application responded swiftly to user's inputs, the visualization at screen of the maps was with the good quality. The testing revealed problems with "Target area" data box. However, with a subsequent test iteration, where changes to the MUC land location, this problem disappeared.

6 Evaluation

The Case study 2, Switchgrass to 2G ethanol, underwent comprehensive testing, with only one defects being observed on Target area databox.

Additional Test Cases were designed and executed to explore the Value Chain Data Box legibility, and data accuracy with respect to literature and own observations in the field, following correction and re-testing it is believed that accuracy will be acceptable in use.

There are no problems were observed with navigation, interface working and databoxes despite the low performance characteristics of the notebook.

7 Summary of Activities

This section provides a summary of the major testing activities and events for the test performed for each <*Ukraine, Case Study 2, Kyiv/Chernihiv region*> and <Switchgrass for 2G ethanol>. This section also summarises testing resource information, such as total staffing levels (how many people performed the *same* test), total testing time, characteristics, etc etc.

Test Start Date: June 3rd 2021, @3:10 pm *Test End Date: June 3rd 2021, @ 3:40 pm*

Item	**Planned**	**Actual**
Staff Levels	*2*	*2*
Test Design Effort	*1*	*2*
Test Execution Effort	*2 each*	*4 each*
Re-Test Effort	*1*	*2*
Overall test evaluation	*Positive*	*Positive*
Expected malfunctioning	*NO*	*YES*
Critical malfunctioning	*NO*	*NO*
Overall testing result accuracy	*Good*	*Good*
Inaccuracy attributable to:	-	*Target area databox*
Layers quality	*MUC lands: High* *Suitability: High* *BPPs: High*	*MUC lands: High* *Suitability: Medium* *BPPs: High*
Etc. feel free to add other summary categories as you see fit		

3.6 Spain

Test Summary Report

Test Information	
Project ID:	BIOPLA-EU
Document Ref:	Spain, Case Study 1, Albacete
Iteration ID:	Camelina for biodiesel
Author:	*Alfonso Calera, UCLM*
Date:	10 June 2021

1 Introduction

1.1 Background

This document provides the background for the testing activities within iteration Spain, Case Study 1, Albacete, through the testing of Camelina for Biodiesel scenario. The province of Albacete is located in the Southeast of the Iberian Peninsula and extends over part of the southern plateau, at about 700 meters above sea level. The traditional annual crops in dry land are cereals, wheat and barley, together legumes such as peas, lentils, among others, and in some areas sunflower. Typical crop rotation is a cycle of three year, like cereal-cereal-legume, although one-year fallow also is a usual practice. Permanent crops such as vineyards and almonds occupy an important part of agricultural soils. The main limiting factor in the production of rainfed agriculture is the low rainfall and its high interannual variability, what is typical of Mediterranean climate. For typical cereals such as wheat and barley, the average total biomass production is around 5-6 ton/ha, from which 2-3 ton/ha in grain, and the rest straw. This low production is coupled with low prices, bringing the profitability of rainfed agriculture very close to survival levels. The subsidy from the CAP is vital for the maintenance of productive activity in many areas.

1.2 References

N/A

2 Overview

Scenario 1 for the testing of the WebGIS in the context of Task 4.2 of the BIOPLAT-EU project was begun on June 10th 2021 at 2:00 pm and completed on June 14th 2021 at 2:30 pm. During this test the following sections of the WebGIS platform were considered:

Layers menu,

STEN tool,

Info Panels,

Value Chain Data Box,

Advanced Indicators

The testing was conducted on an HP Notebook Pro with 32Gbytes of memory running Microsoft Windows 10 Professional, a Wi-Fi broadband connection with results from speedtest.net of 100 Mb/s in download and 20 Mb/s in upload. Browser used is Google Chrome. The testing did not present any bug, any action and control responded smoothly to user's inputs. The yield provided by the system was considered low compared to data from the literature and it was manually edited in the Value Chain Data Box. Simulations were smooth and responsive, the results presented in a clear manner. The system has some issues (known) including some faulted visualization of layers after zooming in and out quickly. No other relevant aspect or inefficiency is reported.

2 Variances

Camelina yields and suitability are lower than expected. This is probably due to GAEZ, the source of the data, however these could be changed in the Value Chain Data Box and the analysis was carried out.

4 Assessment

The testing started with the loading of the website and the logging in as advanced user.
Visualization of all maps was successful and responsive. The Open Street Maps was chosen at first, then the satellite (Bing aerial) images were selected to spot and double check layer accuracy. The Sentinel images seem to have much lower resolution and are less practical than Bing- Aerial.
Contaminated land layer. The layer responds promptly.
Underutilized lands layer. The layer responded promptly. Some areas mapped seemed to overlap land features including farms and arable land (not underutilized) but for the most part all MUC lands in Albacete region are well mapped.

The selection of the BPS worked smoothly.
The area size shown in the right information box is not the same as the surface of BPS in STEN tool
The selection of crop management/input level, water supply, the crop and bioenergy pathway was simple and intuitive, also this is due to the familiarity of the user with the system.

Energy Access – values

Not measured because of lack of data.

Income – values

Same as above.

Results were presented quickly after the selection of the "simulate" button.

5 Results

Test Case Study 1, Spain, Camelina for Biodiesel, was carried out with great ease. The web application responded swiftly to user's inputs, the visualization at screen of the maps however was slightly slow

considering the fast internet connection. Differences were detected in the Layer Tab when selecting the Satellite Imagery (Bing – Aereal) vs the Sentinel set of images, making the latter apparently superfluous because affected by much lower resolution (making its function useless).

6 Evaluation

The testing was complete and informative about the potentialities of the system. Several iterations have been performed on the same value chain, in various MUC patches in the same target area. The results have been consistent. It seems that some data from databases are underestimating inputs as well as yields.

Additional Test Cases were designed and executed to explore the Value Chain Data Box legibility, and data accuracy with respect to literature and own observations in the field, following correction and re-testing it is believed that accuracy will be acceptable in use.

Since a number of problems were observed with navigation, and only once re-loading the page re-testing was possible (especially when switching languages and selecting BPP's locations manually), it is thought that there will be a Medium likelihood of navigation failure in use if user load increases.

7 Summary of Activities

This section provides a summary of the major testing activities and events for the test performed for Case Study 1, Spain, Albacete, Camelina for biodiesel.

Test Start Date: June 10th 2021, @2:00 pm *Test End Date: June 14th 2021, @ 2:30 pm*

Item	**Planned**	**Actual**
Staff Levels	*3*	*2*
Test Design Effort	*1*	*2*
Test Execution Effort	*2 each*	*5 each*
Re-Test Effort	*1*	*2*
Overall test evaluation	*Positive*	*Positive*
Expected malfunctioning	*NO*	*NO*
Critical malfunctioning	*NO*	*NO*
Overall testing result accuracy	*Good*	*Good*
Inaccuracy attributable to:	*Data*	*Data (GAEZ)*
Layers quality	*MUC lands: High* *Suitability: High* *BPPs: Medium*	*MUC lands: High* *Suitability: Low* *BPPs: High*

Etc. feel free to add other summary categories as you see fit		

4 Conclusions

Deliverable D4.2 returned a wealth of key lessons for the further development of the WebGIS tool. The overall evaluation of the webGIS has been positive and the tool is perceived, already in this beta version, as a useful aid to foster market uptake of bioenergy produced on marginal, underutilized and contaminated lands in Europe and Ukraine. The tool works well in most scenarios without particular criticalities, no test reported crashes or relevant impediments, and results are consistent. That being said, as expected, numerous suggestions about room for improvement in many areas have been made. During the fine-tuning phase, until M36, the technical team of BIOPLAT-EU will take these suggestions highlighted by case study Partners and attempt to address them. These can be grouped into two categories for better understanding of their relevance and the implications for their implementation.

The first category of suggestions (A) is linked to key functions of the system. The second category (B) is the one where adjustments to visualization style, language and translation edits, etc fall. These conclusions will focus predominantly on the key function category (A), since all suggestions under category (B) can and will be implemented until M36.

(A) Key functions of the system.

Several case study Partners, through their thorough assessments of the value chains they are more familiar with in their own territory, brought to the surface and highlighted aspects that have been overlooked during the development of the webGIS tool including STEN. Others, already known issues and criticalities, have been confirmed as extremely relevant and needing further work. One aspect that has been overlooked from the onset of the project was raised by Germany and Ukraine. When selecting a given MUC patch the system refers to the database of suitability maps to identify and pre-select the sub-group of crops for the list of BIOPLAT-EU bioenergy crops that can be grown on those MUC lands according to GAEZ[19]. During the kick-off meeting a decision about the threshold for suitability was made. Crops whose suitability was lower than 30% of optimal, were considered not suitable for a given MUC land and therefore the system was built around such assumption. However, this assumption was based on the trust towards the capabilities of the GAEZ which remain strong, however, further research revealed that the suitability of recent varieties and clones, especially of perennial crops where much research has been concentrated over the years, is not correctly considered by GAEZ. Additionally, for those bioenergy crops not mapped by GAEZ, the dataset used (from the JRC Forest Atlas) show potential suitability of regular breeds, whereas improved breeds can show much higher survivability and consequently, higher yields. New clones and varieties of poplars, willows, but also miscanthus for example, can grow well in areas where naturally occurring varieties struggle, and produce with less inputs and higher efficiency considerable amounts of biomass.

The presence of *advanced user* features of STEN could allow to circumnavigate such lack of default data. The Technical Team have found a solution. The advanced user is able now to select

[19] The Global Agro-Ecological Zooning tool of FAO. http://www.fao.org/nr/gaez/about-data-portal/agricultural-suitability-and-potential-yields/it/

any crop (from the list) from the suitability ranges according to the available databases (i.e. GAEZ + JRC). This action can be done from the edit button next to the crop combo. In this way, an advanced user can simulate any agronomic information. He can set any crop for a BPS, defining the yield parameter and the Unitary water requirement (only if the water supply is irrigated).

Another rather crucial aspect that interferes with key functions of the STEN and its overall usability is linked to the inability to select more than one MUC patch at the time. This feature has also been discussed already very early in the development stage and a solution could not be found. It remains the strong relevance of this aspect for the usability of the tool, especially by potential investors as well as for groups or associations of farmers/biomass producers. The inherent problem lays in the geographical and coordinate system used by the webGIS tool. The tool is not capable of processing multiple MUC parcels at the same time because these are linked to a specific target area. Distances and consequent time requirements for transporting biomass and bioenergy products are associated with this system where the target area is the fundamental unit. However, a possible solution could be found for those MUC lands withing contiguous municipalities, which then would constitute one single target areas. In case this condition is satisfied, the fine-tuning of the model could lead to assuming that the center of gravity of the MUC patch is actually the center of gravity of the target area and therefore the system could calculate *average distances* and related attributes from that point. Of course, any other variable should remain fixed for the simulation (e.g. same crop, assuming same suitability and an average yield, etc). This function will likely be available only to advanced users.

Allowing the user to simulate a bioenergy project which interests multiple MUC parcels simultaneously is not guaranteed but would certainly raise the bar in terms of representativeness of the results and have a greater impact on the market uptake of biomass produced from these lands.

One last key function issue detected by partners (Hungary) and already known to the Technical Team of developers is linked to the map of potentially contaminated sites in Europe. This map, as thoroughly explained in D2.1, is the result of data provided by the JRC on heavy metal content in topsoils in Europe. The presence of heavy metals in those soils cannot be measured and assessed in the context of BIOPLAT-EU and therefore this change is difficult to address. A disclaimer about the nature of this data is already available to all users, and all users are free to turn off the Potentially Contaminate Lands layer. Further discussion on this will be held in occasion of the upcoming webinars and meetings with local stakeholders to explain this issue and seek a viable solution.

In conclusion, as planned, the fine-tuning period (M30-36) will be crucial for addressing the above elements and the several minor issues highlighted by the testing under Task 4.2 and to ultimately publish a powerful and trusted tool.