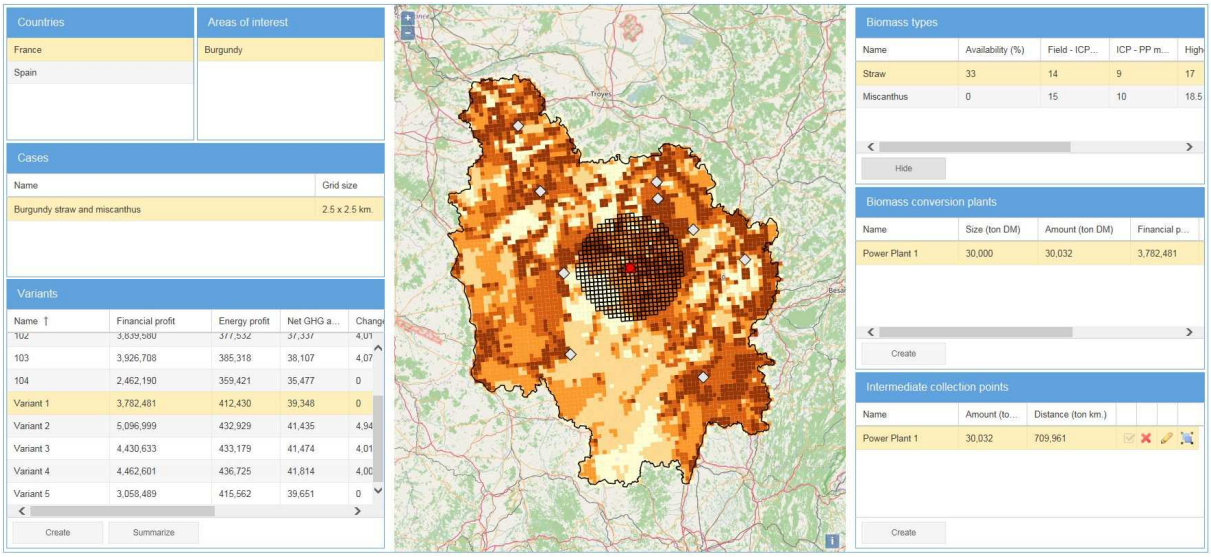
LocaGIStics user instruction

Version 18 November 2016

General information:
This tool supports the user to design biomass delivery chains at regional level (implemented for Burgundy and Spain) and to analyse in a comparative way (for different biomass delivery chains) the economic and GHG emission and mitigation potential and the spatially explicit land use and environmental implications. It uses data about biomass supply, different biomass conversion and pre-treatment technologies and novel logistical concepts of biomass hubs and yards.

Getting started:
The starting screen below shows a map of the selected country and region.



In the map displayed the grey diamonds refer to suggested power plant locations as analysed by the BeWhere tool analysis (see in the main user interface the 'Tools' --->'BeWhere'). Each of these suggested locations refers to one power plant to which the biomass is directly sourced from the field without making use of intermediate collection points.

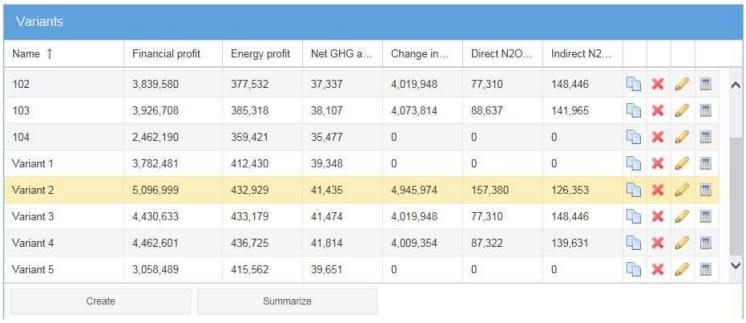
In the LocaGIStics tool the user is now invited to design one or more biomass delivery chains choosing the size and location of the power plant while designing the chain with or without intermediate collection points.

Use of LocaGIStics tool:
To operate the tool one starts specifying the choices in the top left hand pane ('**Countries**'), going down to the **'Variants'** pane on the left side, and then moving to the top right panes specifying '**Biomass types**' '**Biomass conversion plants**' and finally the '**Intermediate collection points'**.

<u>Countries, Areas of interest, Cases pane:</u>

You can choose these panes to specify the case study:

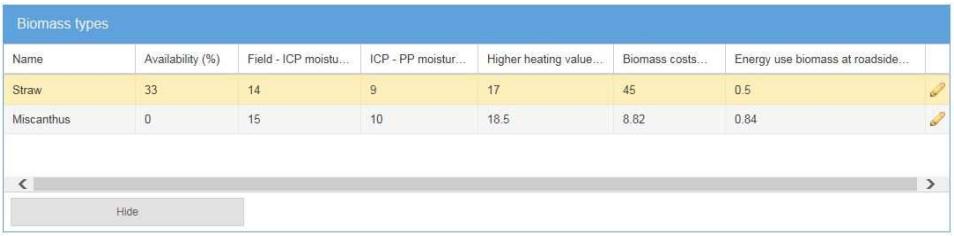
Variants pane: Click on the '**Create'** button and give a name for the variant of the chain you are going to design (e.g. 'only straw' or 'mixed straw and Miscanthus'). Then click on the '*Submit*' button. You can see that the variant that you have just created is now highlighted with a yellow bar. If needed you can edit the name of the variant using the icon.

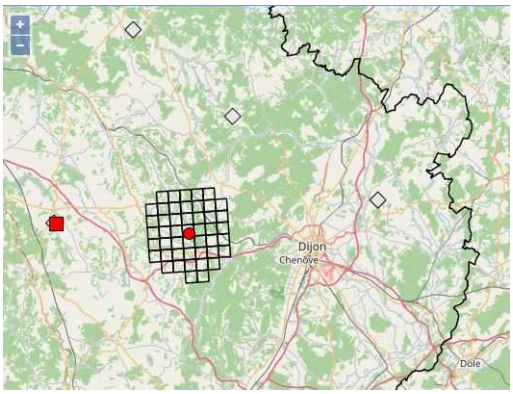


Note: Always check later on if the correct variant is still chosen (highlighted) because this might sometimes be accidentally changed in this prototype e.g. after a calculation.

Note: Unfortunately there is a limit to the width of the columns depending on the size of your screen. You can change the size of the columns in each pane by putting your pointer on the border of the column and dragging it to one side. This way you can better read the heading and/or the data.

Biomass types: This section shows the available biomass types (in the Burgundy case these are straw and Miscanthus). You can choose the actual percentage of a biomass type that you want to include in your analysis (this could be lower than the maximum). The choice could be e.g. to use only straw, then you need to set the percentage of the other biomass types (now only Miscanthus is included) to '0'. Use the icon to edit the biomass availability and related properties (field moisture % and moisture content after intermediate collection/pre-treatment). After editing click on '*submit*' button.



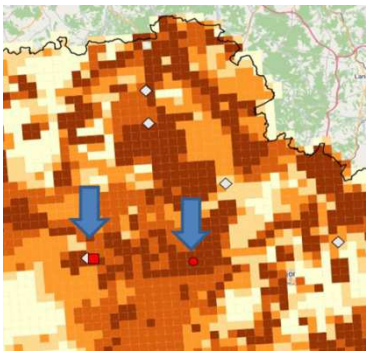


Note: *All biomass properties have a default settings (in this case 33% straw and 0% Miscanthus), but can be changed by the user.*

Note: The map shows the biomass availability in a grid pattern. Deep coloured grids have higher biomass availability then light coloured grids. The 'active' biomass type (highlighted with the yellow bar), for which a biomass conversion plant is selected is shown on the map. In the Burgundy case straw is yellow and Miscanthus is purple.

Note: One can also hide the biomass map in order to see the topographical map of the area containing roads, cities, etc.

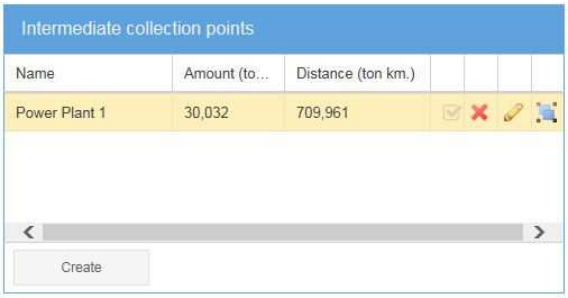
Biomass conversion plants: In this pane you define the power plant location and demand size (in this example the demand size is chosen to be 30,000 ton of biomass, and only small size deviations of about 10% can be made). By clicking the '*Create*' button one can add a new power plant and specify its name and size in terms of amount of biomass (in ton dry matter) processed on a yearly basis. After clicking '*Submit*' a power plant is located on the map (red square) in the centre of the region.



You can now move the red square to the location on the map where you want to locate the plant.

Note: The suggested locations by BeWhere (grey diamonds in the map) can be used as a reference point, and the biomass density shown on the map (brown grids) are also meant to be a guidance.

Intermediate collection points: In this pane the intermediate collection points supplying to the Biomass conversion plant that was just designed in the former pane can be defined. The first step is to click on '*Create*' and then assign a name. Then click on '*Submit*'.



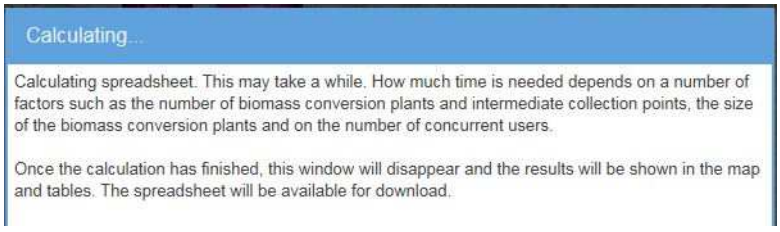
You will see a red circle on the map indicating the location of the intermediate collection point. You can now click on this red circle and drag it to the position where you want the intermediate collection to take place (most likely the place selected should be where the biomass is most concentrated spatially so that you obtain short transport distances to the intermediate collection point). If you want the intermediate collection to coincide with the power plant itself you can click on the  icon in the 'Intermediate collection point' pane. This definition of intermediate collection points can be repeated for a second intermediate collection point.

Note: a minimum of one and a maximum of two intermediate collection points per power plant needs to be selected.

After this step more power plants can be added together with their collection points by repeating the definition steps in the 'Biomass conversion plants' and 'Intermediate collection points' panes.

Calculation of results: If the user thinks all biomass types, power plants and intermediate collection points have been defined properly the calculation of the results can be generated. To do this the user needs to go back to the **'Variants'** pane and press the calculator  icon.

Note: Only press the icon once. The system then starts to calculate. This can take a few minutes. You will get the following screen:



Do not press again on the calculator but wait until the tool generates the calculation results: These results will appear in several places:

1) A grid pattern will appear on the map indicating the grid cells sourcing the defined power plants.
2) In the '**Variants**' pane the *financial profit, energy profit* and the *GHG avoided* is specified as assessed for the defined biomass conversion plants.
3) In the '**Biomass conversion plant**' pane the *financial profit, energy profit* and the *GHG avoided* are quantified but specifically for the biomass conversion plant

Calculation of new variants and comparison of performance of biomass delivery chains: To make a new design there are two options:

- In the '**Variants**' pane click on '*Create*' and give your new design a name
- In the '**Variants**' pane click on the former variant created and click on the copy icon. The former design can then be adapted with new specifications by going through the definitions steps in the 'Biomass Types', 'Biomass conversion plants' and 'Intermediate collection points' panes as described above.

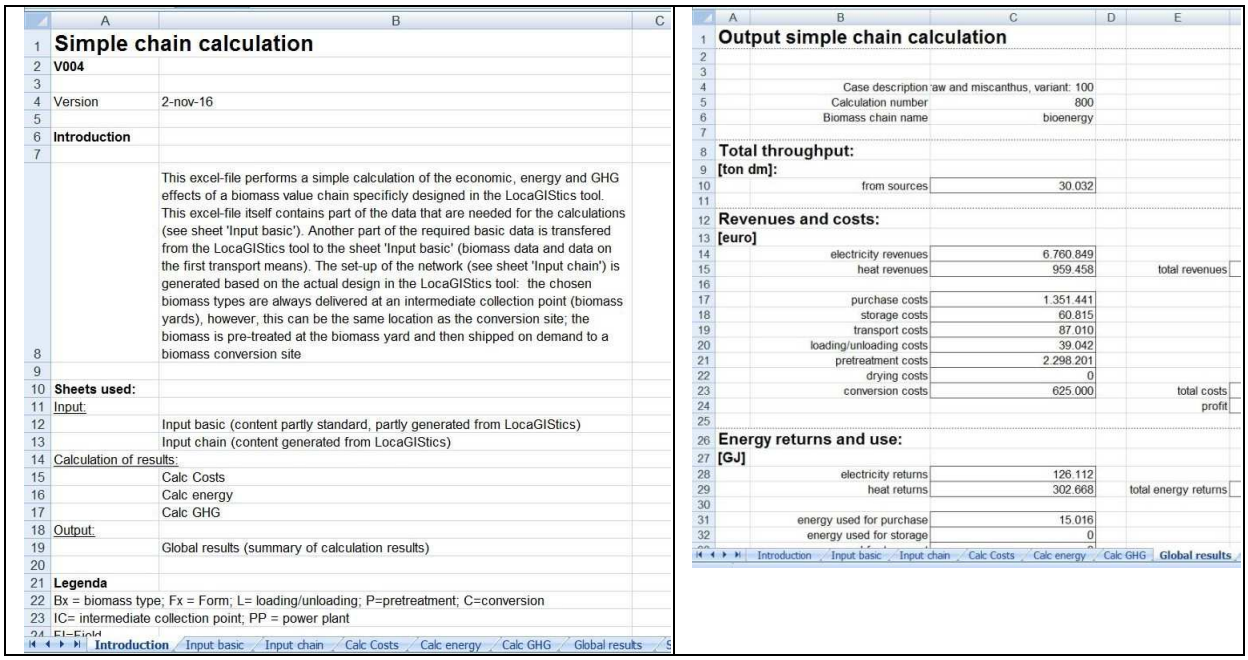
If a Variant or a plant specification or an intermediate collection point needs to be removed just click on the icon.

Per design more biomass conversion plants and per plant more intermediate collection points can be specified and results displayed on the map.

Simple sheet

The calculations and the calculation results can also be displayed in an excel file. This can be accessed by clicking on the excel icon in the Biomass conversion plant pane. The system will then start up excel on your computer and display the calculation sheets and results.

Note: there are more working sheets showing the different input variables and calculation of the main indicators quantified in the tool on costs and revenues, energy use and returns, calculation of GHG emissions and avoided.



	A	B	C
1	**Simple chain calculation**		
2	**V004**		
3			
4	Version	2-nov-16	
5			
6	**Introduction**		
7			
8		This excel-file performs a simple calculation of the economic, energy and GHG effects of a biomass value chain specificly designed in the LocaGIStics tool. This excel-file itself contains part of the data that are needed for the calculations (see sheet 'Input basic'). Another part of the required basic data is transfered from the LocaGIStics tool to the sheet 'Input basic' (biomass data and data on the first transport means). The set-up of the network (see sheet 'Input chain') is generated based on the actual design in the LocaGIStics tool: the chosen biomass types are always delivered at an intermediate collection point (biomass yards), however, this can be the same location as the conversion site; the biomass is pre-treated at the biomass yard and then shipped on demand to a biomass conversion site	
9			
10	**Sheets used:**		
11	Input:		
12		Input basic (content partly standard, partly generated from LocaGIStics)	
13		Input chain (content generated from LocaGIStics)	
14	Calculation of results:		
15		Calc Costs	
16		Calc energy	
17		Calc GHG	
18	Output:		
19		Global results (summary of calculation results)	
20			
21	**Legenda**		
22	Bx = biomass type; Fx = Form; L= loading/unloading; P=pretreatment; C=conversion		
23	IC= intermediate collection point; PP = power plant		
24	FI=Field		

Introduction | Input basic | Input chain | Calc Costs | Calc energy | Calc GHG | Global results

	A	B	C	D	E
1	**Output simple chain calculation**				
2					
3					
4		Case description	aw and miscanthus, variant: 100		
5		Calculation number	800		
6		Biomass chain name	bioenergy		
7					
8	**Total throughput:**				
9	**[ton dm]:**				
10		from sources	30.032		
11					
12	**Revenues and costs:**				
13	**[euro]**				
14		electricity revenues	6.760.849		
15		heat revenues	959.458		total revenues
16					
17		purchase costs	1.351.441		
18		storage costs	60.815		
19		transport costs	87.010		
20		loading/unloading costs	39.042		
21		pretreatment costs	2.298.201		
22		drying costs	0		
23		conversion costs	625.000		total costs
24					profit
25					
26	**Energy returns and use:**				
27	**[GJ]**				
28		electricity returns	126.112		
29		heat returns	302.668		total energy returns
30					
31		energy used for purchase	15.016		
32		energy used for storage	0		

Introduction | Input basic | Input chain | Calc Costs | Calc energy | Calc GHG | Global results