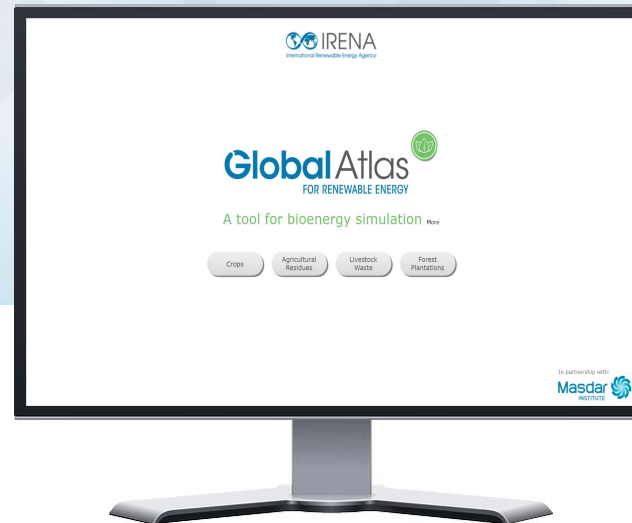
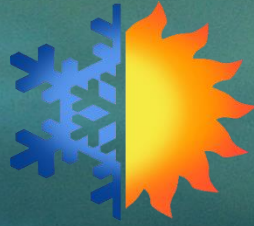


IRENA Global Atlas – Bioenergy Simulator

April 25 2017



Overview of Bioenergy Simulator



Data sources



Implementation partner



Technical and financial support



Background

- **4 potential sources**
 - **Crops** – highlighting 14 common bioenergy crops
 - **Agricultural residues** – encompassing 30 different residues
 - **Livestock waste** – covering 9 specific waste types
 - **Forest plantations** – including 52 tree species
- **25 production processes**
 - 6 types of biofuels among liquid, solid and gaseous fuels
 - 19 different bioenergy conversion technologies
- **3 energy uses** - transport, heating, electricity

Overview of Bioenergy Simulator

Start the simulation



Global Atlas

FOR RENEWABLE ENERGY

A tool for bioenergy simulation [More](#)

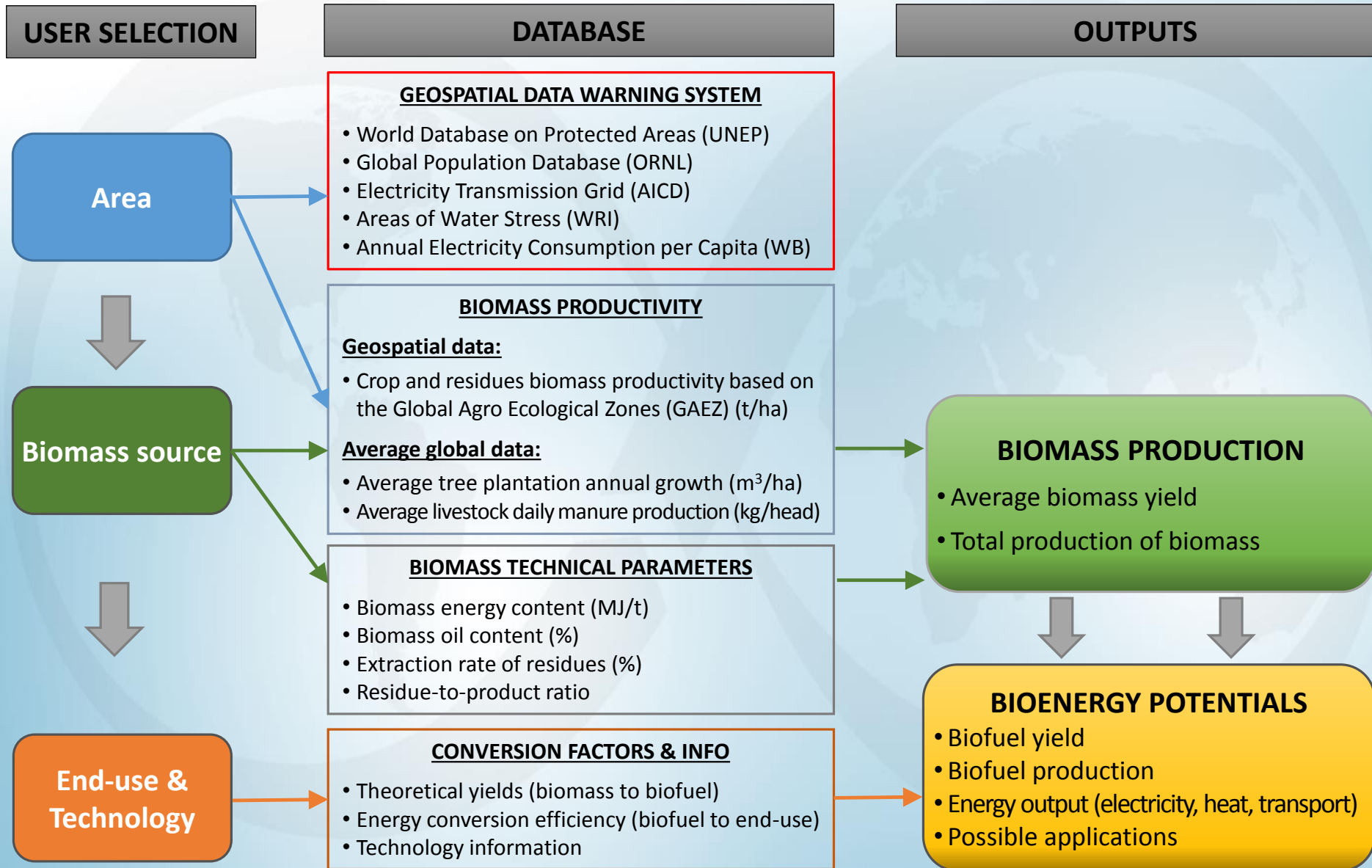
Crops

Agricultural
Residues

Livestock
Waste

Forest
Plantations

In partnership with:



Overview of Bioenergy Simulator

Area Selection

Define the Area

1

Define the Process

2

See Results

3



Overview of Bioenergy Simulator

Source selection



AGRICULTURAL RESIDUES DATA

Selected Area (ha)

23



Crop

Sunflower

Average crop yield (t/ha)

Select a value: Default - Rain-fed condition

- | | | |
|-------------------------------------|----------------|-----|
| <input type="checkbox"/> | High inputs | 2.8 |
| <input checked="" type="checkbox"/> | Intermediat... | 1.2 |
| <input type="checkbox"/> | Low inputs | 0.4 |

Residue

Stover

Moisture content (%)

Default: 0

Residue to product ratio

Default: 2

Utilization of agricultural residues for bioenergy

uses (%)

Default: 70



Warning

The selected area contains

- Areas that are protected.
(World database of Protected Areas - UNEP-WCMC)

Information

The selected area contains

- Maximum value of population density of 392 people per km²
(LandScan 2014 Global Population Database - Oak Ridge National Laboratory)

TECHNOLOGY

Bioenergy end-use

End use and technology selection

TECHNOLOGY

Bioenergy end-use

Heat & power

Bioenergy conversion technology ⁱ

Biomethane chp - gas turbine

Overall energy efficiency of the selected technology

Overall electrical efficiency

Default: 0.35

Overall thermal efficiency

Default: 0.45

TECHNOLOGY INFORMATION

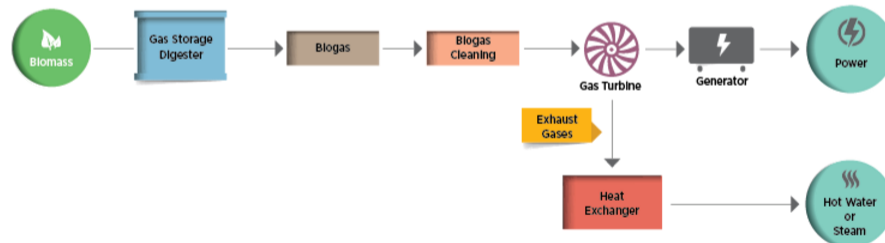
Biofuel used

Biogas is a mixture of primarily biomethane (CH₄) and carbon dioxide (CO₂). It is produced by bacteria through anaerobic digestion of organic wastes (e.g. sewage, manure, food wastes, landfill). The remaining non-digestible solids are collected as sludge which can be valuable as fertiliser in agriculture. The biogas can be treated and purified to become natural gas or biomethane.

Bioenergy conversion technology

Anaerobic digestion is a process which takes place in almost any biological material that is decomposing and is favoured by warm, wet and airless conditions. The resulting gas consists mainly of methane and carbon dioxide and is referred to as biogas. The biogas can be used, after clean-up, in internal combustion engines, micro-turbines, gas turbines, fuel cells and stirling engines or it can be upgraded to biomethane for distribution. Combined heat and power (CHP) or cogeneration is a technology used to improve energy efficiency through the generation of heat and power in the same plant, using a gas turbine with heat recovery.

PROCESS SCHEME ⁱ



Final result



SUMMARY OF THE SELECTED BIOENERGY SUPPLY CHAIN

Type of crop: Sunflower

Biomass feedstock: Sunflower Stover

Biofuel produced: Biomethane

Bioenergy conversion technology: Biomethane chp - gas turbine

Bioenergy end-use: Heat & power

RESULTS

Land area: 23 ha

Crop average yield: 1.2 t/ha

Total crop production: 27.6 t

Total agricultural residues for bioenergy: 38.64 t

Biomethane yield: 235.2 m³/ha

Biomethane total production: 5,409.6 m³

Bioenergy yield: 8.42 GJ/ha 

Total bioenergy production: 193.664 GJ 

Gross electricity production: 18.979 MWh 

Gross heat production: 24.402 MWh 

POSSIBLE APPLICATION OF THE POTENTIAL BIOENERGY PRODUCTION

Considering that the average annual electricity consumption in France is 7.3 MWh per capita ([The World Bank, 2010 - 2013](#)), the estimated electricity production could supply n. 3 person(s)/year.

INFORMATION

The results obtained from default values should be carefully interpreted and it is important to keep in mind the objective of the simulation is to understand the potential bioenergy production for a given area, biomass and associated technologies.

The results include the gross energy production at the plant gate and energy losses in distribution network and due to other operations are not considered.

The Bioenergy Simulator does not assess the socio-economic feasibility and the environmental impacts of the selected bioenergy value chains at any scale of the investment. Field surveys and in-depth further assessments should be conducted to identify the most appropriate technologies for bioenergy production.

Overview of Bioenergy Simulator

Feedback

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Feedback form

Email *

Category *

Did the results match your expectation? * Yes No

What were you expecting?

Value

Range

I would like to be contacted to share references for the expected results.

Message *

Overview of Bioenergy Simulator

Explore the bioenergy simulator



Global Atlas

FOR RENEWABLE ENERGY

A tool for bioenergy simulation [More](#)

Crops

Agricultural
Residues

Livestock
Waste

Forest
Plantations

<http://irena.masdar.ac.ae/bioenergy>

In partnership with: