



# REVAMP User Guide

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## Introduction

Resource Value Mapping (REVAMP) is a decision support tool for rapidly estimating the resource recovery potential from organic waste streams, based on a material flow analysis approach. The present version of REVAMP includes three waste streams: faecal sludge, sewage sludge and the organic fraction of municipal solid waste; and four resource recovery technologies: anaerobic digestion, drying and densification to generate solid fuels, black soldier fly processing to generate animal feed and fertilizer, and composting<sup>1</sup>. The tool allows to estimate the potential amount of recovered product, its energy and nutrients contents and the potential revenue that could be obtained when sold.

## How to access REVAMP

An online version of the tool is available at the website <https://revamp.earth>. The tool can be accessed by clicking “REVAMP TOOL” – on the menu at the top of the home page (See Figure 1).



Figure 1. Access to REVAMP Tool from home page

## Navigating REVAMP

The REVAMP Tool page offers four tabs for input data: Waste Streams, Waste Quality, Treatment Processes and Prices. You access each of these tabs by clicking on the buttons under Step 1 and Step 2, presented in the blue frame in Figure 2, located on the REVAMP tool page.

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<sup>1</sup> A brief description of the included waste streams and recovery technologies is presented in the Glossary.



calorific value. Some parameters, like total nitrogen in Figure 4, appear twice in the Waste Quality tab, differentiating when the main phase of the waste stream is liquid (e.g. mg N/L) or solid (e.g. mg N/kgTS). In these cases, filling up one of the fields is enough to estimate nutrients recovery.

**Waste quality**  
Waste quality has default data on the physical and chemical characteristic of waste streams. You are free to change these.

[show references +](#)

	Units	Faecal sludge	Sewage sludge	Solid waste
Total solids, TS	%	3.0	5.0	28.9
Total solids, TS	mg/L	30000.0	0.0	0.0
Volatile solids, VS	% TS	57.0	65.0	74.0
Total nitrogen, TN	mg N/L	3310.0	0.0	0.0
Total nitrogen, TN	mg N/kg TS	0.0	2500.0	18.9
Total phosphorus, TP	mg P/L	390.0	0.0	0.0
Total phosphorus, TP	mg P/Kg TS	0.0	16000.0	2.7
Total potassium, TK	mg K/L	120.0	0.0	0.0
Total potassium, TK	mg K/kg TS	0.0	4000.0	19.5
Calorific value, CV	MJ/Kg TS	16.2	16.0	17.3
Biomethane potential	NM <sup>3</sup> CH <sub>4</sub> /tonne VS	304.0	304.0	445.0

Figure 4. Waste Quality tab in REVAMP Tool

Near the top of the Waste Quality tab, the “Show Reference” button is located. This button allows the user to include comments about the source, methods and/or conditions related to each parameter value, as shown in Figure 5.

**Waste quality**  
Waste quality has default data on the physical and chemical characteristic of waste streams. You are free to change these.

[show references +](#)

	Units	Faecal sludge	Sewage sludge	Solid waste
Total solids, TS	%	3.0	5.0	28.9
	Comments			
Total solids, TS	mg/L	30000.0	0.0	0.0
	Comments			
Volatile solids, VS	% TS	57.0	65.0	74.0
	Comments			
Total nitrogen, TN	mg N/L	3310.0	0.0	0.0
	Comments			

Figure 5. Show References in Waste Quality tab

The Treatment Processes tab receives data on the performance of each treatment processes when waste streams are physically and chemically transformed through them (See Figure 6). This tab also includes the “Show Reference” button that allows to add comments related to the values.

Treatment processes

[show references +](#)

	Units	Faecal sludge	Sewage sludge	Solid waste
<b>Anaerobic digestion</b>				
Volatile solids degradation rate, $VS_D$	%	100.0	70.0	60.0
Dry mass reduction rate for anaerobic digestion (AD) residue, $DMR_{AD}$	% of initial TS	67.5	67.5	67.5
<b>Black soldier fly process</b>				
Biomass conversion rate for black soldier fly (BSF) larvae, BCR	%	10.0	10.0	11.8
Dry mass reduction rate for BSF residue, $DMR_{BSF}$	% of initial TS	51.85	51.85	70.0
Total nitrogen (TN) reduction in BSF residue, $TNR_{BSF}$	% of initial TN	40.0	40.0	40.0
Total phosphorus (TP) reduction in BSF residue, $TPR_{BSF}$	% of initial TP	65.5	65.5	65.5
Total potassium (TK) reduction rate in BSF residue, $TKR_{BSF}$	% of initial TK	55.0	55.0	55.0
<b>Composting</b>				
Dry mass reduction in compost, $DMR_C$	% of initial mass	19.4	19.4	19.4
Total nitrogen (TN) reduction during composting, $TNR_C$	% of initial TN	34.3	34.3	50.0
Total phosphorus (TP) reduction during composting, $TPR_C$	% of initial TP	1.77	1.77	1.77
Total potassium (TK) reduction during composting, $TKR_C$	% of initial TK	12.63	12.63	12.63

Figure 6. Treatment Processes tab in REVAMP Tool

The Prices tab contains data on the potential prices at which recovered products can be sold on the local market. Instead of the “Show References” button, the Prices tab includes the “References” column where comments can be added (See Figure 7).

## Prices

Update the prices available in your local market.

Product	Potential price	Units	References
Biogas	<input type="text" value="0.33"/>	US\$/N m <sup>3</sup>	<input type="text"/>
Solid fuel	<input type="text" value="300.00"/>	US\$/ton	<input type="text"/>
Black soldier fly larvae	<input type="text" value="200.00"/>	US\$/ton	<input type="text"/>
Compost	<input type="text" value="5.00"/>	US\$/ton	<input type="text"/>

Figure 7. Prices tab in REVAMP Tool

## Introducing data

When opened for the first time, data fields are filled with random values. If you have data available for some or all the various parameters in your city/town, please fill that data in and replace the default values. Otherwise, you can load data about a project previously uploaded by someone else. This can be done by clicking on the “import case study” button located in the left side of the REVAMP tool page (See blue line in Figure 8).

Resource Value Mapping (REVAMP) is a decision support tool for rapidly estimating the resource recovery potential from organic waste streams including sewage sludge, faecal sludge, and other organic solid waste.

[import case study](#)
 [import your data](#)
 [open user guide](#)

Step 1: <sup>1</sup>

waste streams

waste quality

treatment processes

prices

calculate value

Step 2: <sup>1</sup>

Step 3: <sup>1</sup>

Figure 8. Load and processes buttons in REVAMP Tool

It is possible to load data from a project previously saved, clicking on the “import your data” button (see Figure 8). This data should have been saved in a personal account (accessed by introducing email and password) or by uploading a xml file containing the project data (See Figure 9).

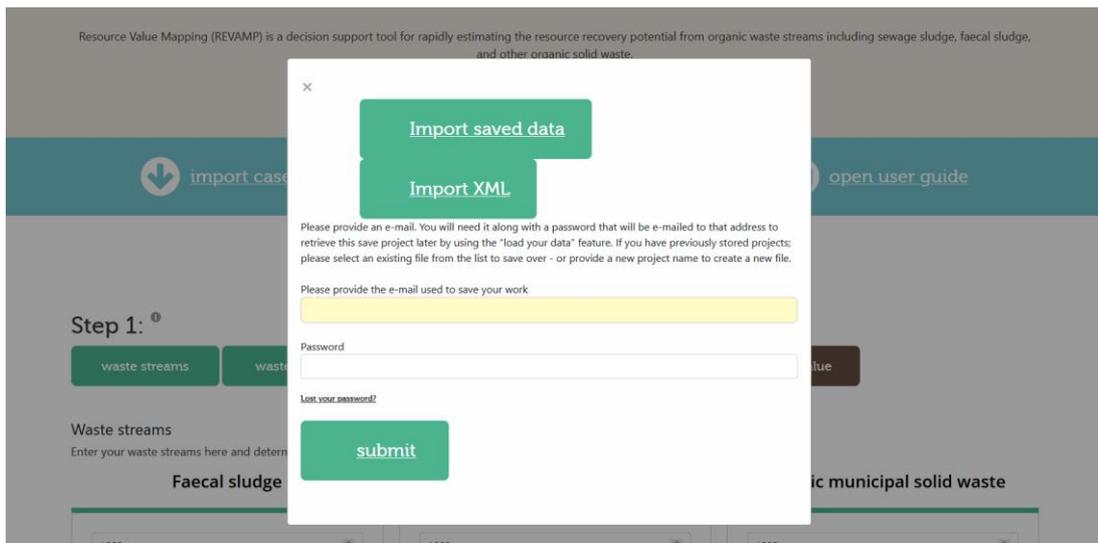


Figure 9. Importing saved data and xml files

## Results Visualization

Once the required data has been filled, the results reflecting the recovery potential can be obtained by clicking in the “Calculate value” button, last one on the right side of the steps (See Figure 8).

The recovery potentials are presented in two tabs (See figure 10). The “charts” tab includes column charts showing the potential energy, nutrients and revenue that can be recovered from each of the three organic waste streams.

The “results” tab presents the detailed numeric information used to build the column charts but organized in tables; there is one table per each recovery technology, including the three organic waste streams.

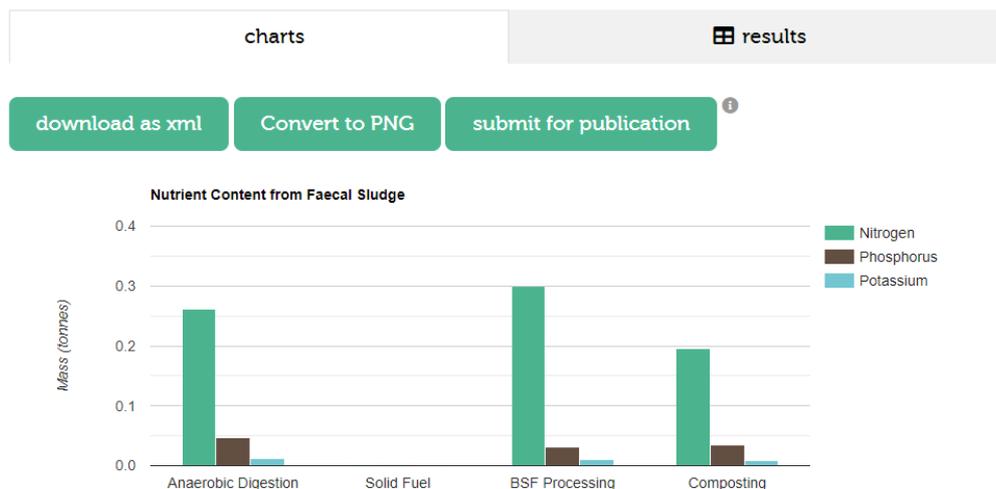


Figure 100. Results tabs in REVAMP Tool

### Saving a Project

A project can be saved at any stage of input data or analysing results by clicking on the “save project” button located on the bottom right side of the REVAMP tool page (black dotted line in Figure 11).

### Prices

Update the prices available in your local market.

Product	Potential price	Units	References
Biogas	<input type="text" value="0.33"/>	US\$/N m <sup>3</sup>	<input type="text"/>
Solid fuel	<input type="text" value="300.00"/>	US\$/ton	<input type="text"/>
Black soldier fly larvae	<input type="text" value="200.00"/>	US\$/ton	<input type="text"/>
Compost	<input type="text" value="5.00"/>	US\$/ton	<input type="text"/>

**save project**

Figure 11. Saving a project in REVAMP Tool

When saving a project, you should specify the name of the project and your email (see Figure 12). You will receive an email with a password that would allow you to access your project in the future.

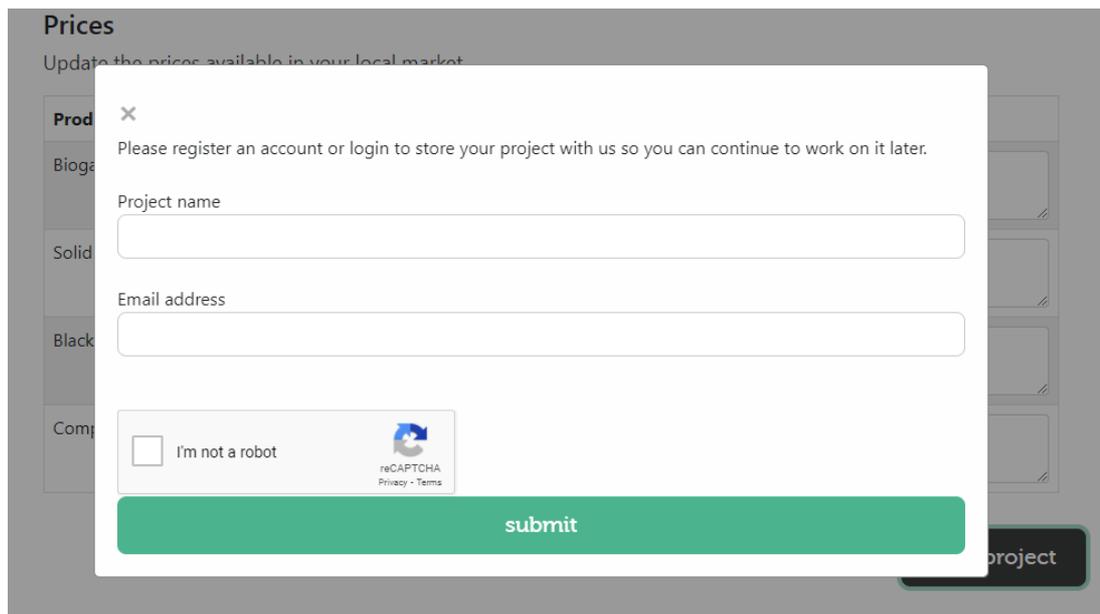


Figure 12. Saving a project in REVAMP Tool

## Exporting a project to xml file

Any of the projects that appears in the project list can be exported as an xml file by clicking the “Download as xml” button, under the results tab (see black line dotted in Figure 10). The xml file contains the project data.

## Glossary

**Faecal Sludge:** Faecal sludge comes from onsite sanitation technologies, i.e., it has not been transported through a sewer. It results from the collection and storage/treatment of excreta or blackwater, with or without greywater. Faecal sludge includes both sludge from pit latrines and that from septic tanks.

**Sewage sludge:** Sewage sludge (also referred to as wastewater sludge) is sludge that originates from sewer-based wastewater collection and (semi-) centralized treatment processes.

**Organic Municipal Solid Waste:** This is the organic part of the urban solid waste and it includes items like food waste, market waste and crop residues

**Anaerobic Digestion:** This is a process which generates biogas, which has about 60% methane content. Biogas can be used for lighting, cooking and also for generating electricity and heat. The process of anaerobic digestion also generates a residue which can be used as soil conditioner or fertilizer in a farm to recover nutrients like nitrogen, phosphorus and potassium.

**Solid Fuel:** Excreta and organic waste streams have a high calorific value and can be turned into a solid dry fuel for combustion in briquette or powder form. This can be used either for cooking in households and institutional kitchens as well as for industrial applications like kilns and boilers.

**Black soldier fly larvae:** Organic waste streams can be treated using fly larvae composting, for example with the Black Soldier Fly, to produce valuable larvae and a residue. The larvae of the black soldier fly are 40% protein and 30% fat and can therefore make a protein-rich animal feed. The residue from the fly larvae composting contains nutrients and can be applied to a garden as soil conditioner or fertilizer.

**Composting:** This is a process whereby a waste stream is composted to make soil conditioner or fertilizer for applying on farms. The compost generated is often rich in nutrients and also rich in organic matter content