



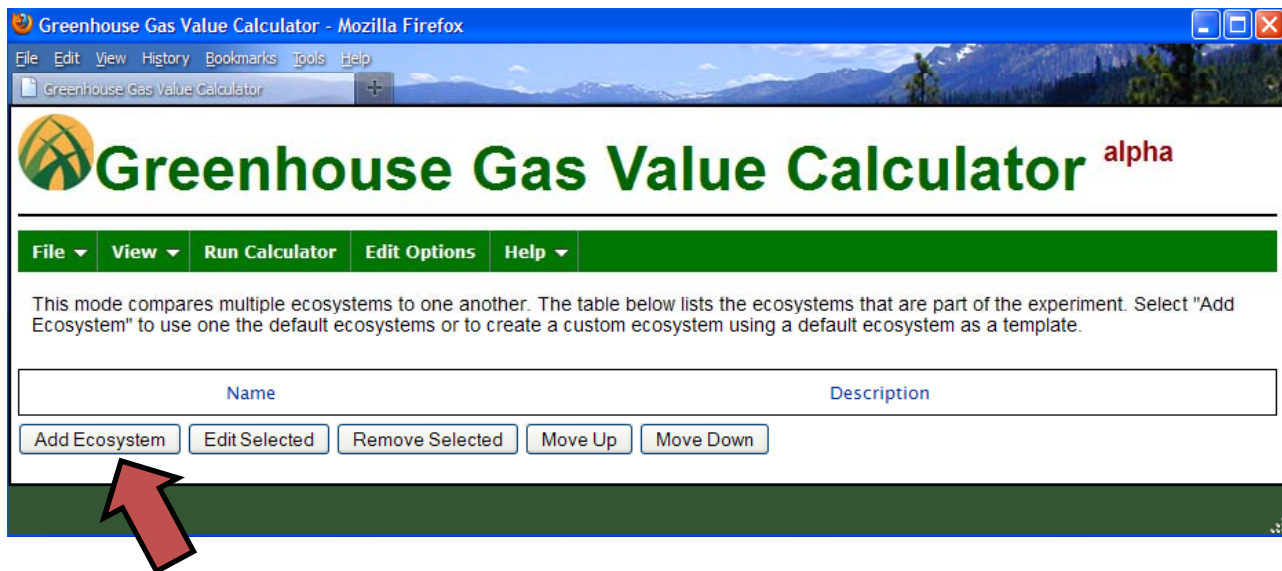
**GLOBAL CHANGE
SOLUTIONS**

Greenhouse Gas Value Calculator Tutorial



Step 1. Select the ecosystems for which you want to calculate *GHGV*.

- When you start the Greenhouse Gas Value Calculator, you will see the following screen:



- Select 'Add Ecosystem' to select ecosystems for your experiment.

- Select the ecosystems for which you would like to calculate GHGV. When done, click “Add Ecosystem(s)”.
- Note that you may also add your own custom ecosystem (link at top).

House Gas Value Calculator

Select one or more ecosystems from the categories below to add them to the calculation. Hold control and click to select more than one ecosystem. To add a custom ecosystem [click here](#).

Native

- Tropical Peat Forest
- Northern Peatland
- Marsh & Swamp
- Tropical Forest
- Temperate Forest
- Boreal Forest
- Tropical Savanna
- Temp. Scrub/Woodland
- Temperate Grassland
- Tundra
- Desert

Regrowing

- Tropical Forest (R)
- Temperate Forest (R)
- Boreal Forest (R)
- Abandoned Land (trop.)
- Abandoned Land (temp.)

Agroecosystems

- Tropical Pasture
- Temperate Pasture
- Tropical Cropland
- Temperate Cropland
- Wetland Rice
- US Corn
- US Soy

Bioenergy Agroecosystems

- Miscanthus
- Switchgrass
- Sugarcane (BR burned)
- Sugarcane (BR no burn)
- US Corn Residue
- Prairie

Add Ecosystem(s)

Cancel



A NOTE ON ECOSYSTEM TYPES

- Even within a category, **ecosystems are variable**.
 - For example, live aboveground biomass in tropical forests can range from <100 ton/ha to >800 ton/ha.
- Ecosystem categories presented here are broad, and default values (based on global data sets unless otherwise specified) may not be appropriate for a specific location.
 - Influential variables such as organic matter storage, cattle density (in pastures), and crop management practices can vary dramatically within some of the *GHGV* Calculator's ecosystem categories.
- Therefore, we caution that **results from the *GHGV* calculator - when run using default parameters - should not be used as off-the-shelf estimates of *GHGV* for any particular ecosystem.**
- We encourage users to critically evaluate the assumptions implicit in the use of default parameters, and to customize parameters as appropriate.

Step 2. Edit ecosystem properties, if desired.

- Back on the main screen, select the ecosystem you wish to edit.

Name	Description
Tropical Forest	Unmanaged tropical (humid or semi-arid) forest with no recent disturbance.
Tropical Savanna	Unmanaged tropical savannas, ranging from grassland savannas to savanna woodland.
Tropical Pasture	Tropical grassland pasture with moderate grazing intensity.
Tropical Cropland	Annually tilled tropical cropland (generic)
Sugarcane (BR no burn)	Brazilian sugarcane agroecosystem, mechanically harvested.
Tropical Forest (R)	Aggrading tropical forest: newly developing or recovering from disturbance.

- You may change any variable in the model (arranged by category). Pay attention to units! 'Save Changes' when finished.

Parameter	Value	Action
Aboveground biomass: live (Mg/ha)	248	Restore Default
Root biomass (Mg/ha)	51.2	Restore Default
Dead wood (dead trees, coarse woody debris) (Mg/ha)	20	Restore Default
Litter (Mg/ha)	10	Restore Default
Peat (Mg/ha)	0	Restore Default
Potential Soil Organic Matter loss (Mg/ha)	88.965517	Restore Default

Step 3. Edit options that apply to all ecosystems.

- Select “Edit Options” on the menu bar.

The screenshot shows the 'Greenhouse Gas Value Calculator' interface. At the top, there is a green header with the calculator's name and 'alpha' in red. Below the header is a menu bar with 'File', 'View', 'Run Calculator', 'Edit Options', and 'Help'. A red arrow points to the 'Edit Options' menu item. Below the menu bar, there is a text box explaining the current mode. Underneath is a table with two columns: 'Name' and 'Description'. The table lists several ecosystems, with 'Tropical Forest' selected. At the bottom of the table are buttons for 'Add Ecosystem', 'Edit Selected', 'Remove Selected', 'Move Up', and 'Move Down'.

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- Select components of *GHGV*, greenhouse gases to include, and options on the treatment of time. Save Changes.

The screenshot shows the 'Edit Options' dialog box. It has a title bar and a main content area. The content area starts with the text 'These options apply to all ecosystems included in the calculation.' Below this is a section titled 'Components of GHGV' with three items: 'Initial Storage (GHG release that would occur upon clearing organic matter)' with a checked checkbox, 'Ongoing Exchange (annual ecosystem-atmosphere GHG exchange)' with a checked checkbox, and 'Forest Fires (probable GHG exchanges from natural disturbance-recovery dynamics)' with an unchecked checkbox. Below this is a section titled 'Greenhouse Gases' with four radio button options: 'Carbon Dioxide (CO2)', 'Methane (CH4)', 'Nitrous Oxide (N2O)', and 'All Three' (which is selected). At the bottom of the dialog box is a section titled 'Treatment of Time' with three input fields: 'Emissions Time Span' (50), 'Analytical Time Horizon' (100), and 'Annual Discount Rate' (0). Each input field has a question mark icon to its right. At the very bottom of the dialog box are two buttons: 'Save Changes' and 'Cancel'.

Step 4. Run the Calculator.

- Select “Run Calculator” on the menu bar.

Greenhouse Gas Value Calculator alpha

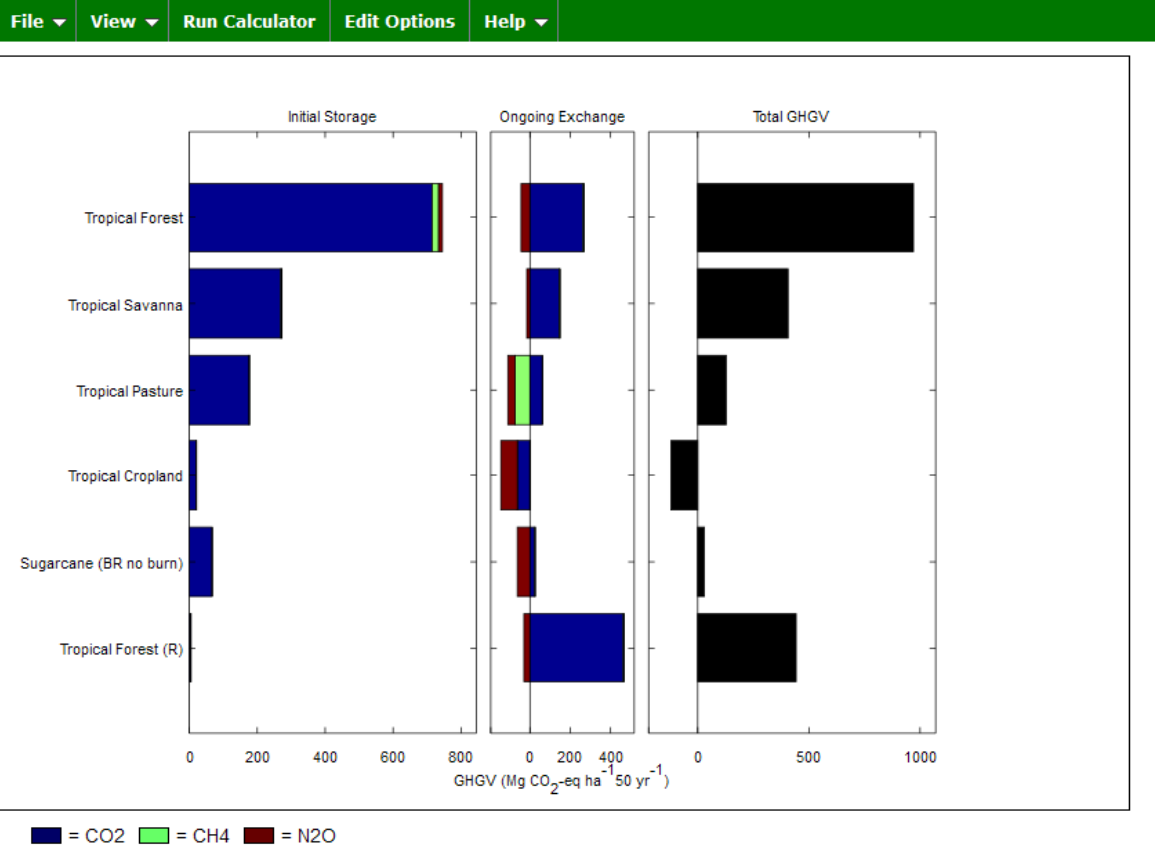
File View **Run Calculator** Edit Options Help

This mode compares multiple systems to one another. The table below lists the ecosystems that are part of the experiment. Select "Add Ecosystem" to use one of the ecosystems or to create a custom ecosystem using a default ecosystem as a template.

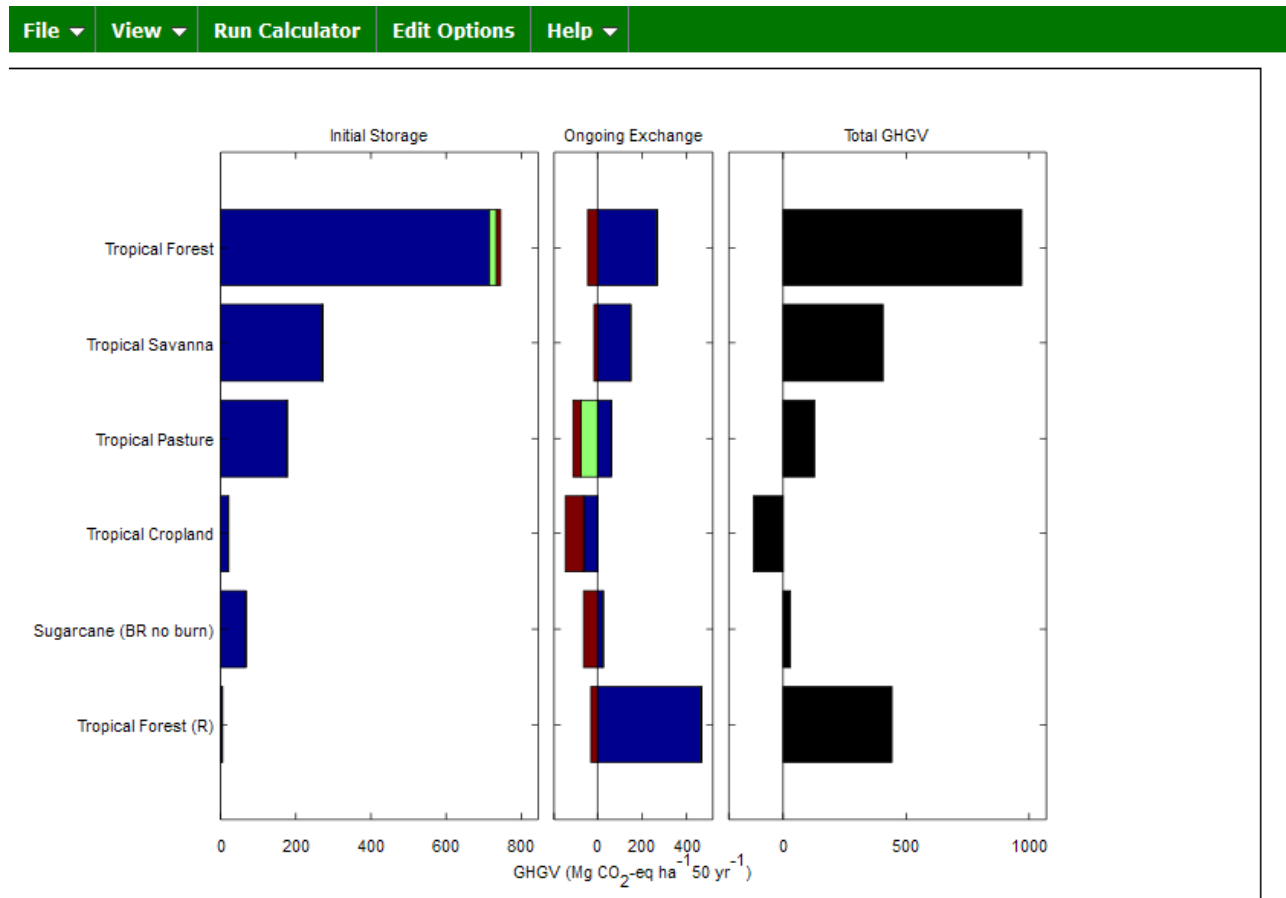
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Add Ecosystem Edit Selected Remove Selected Move Up Move Down

- After a few moments, a results graph will appear.



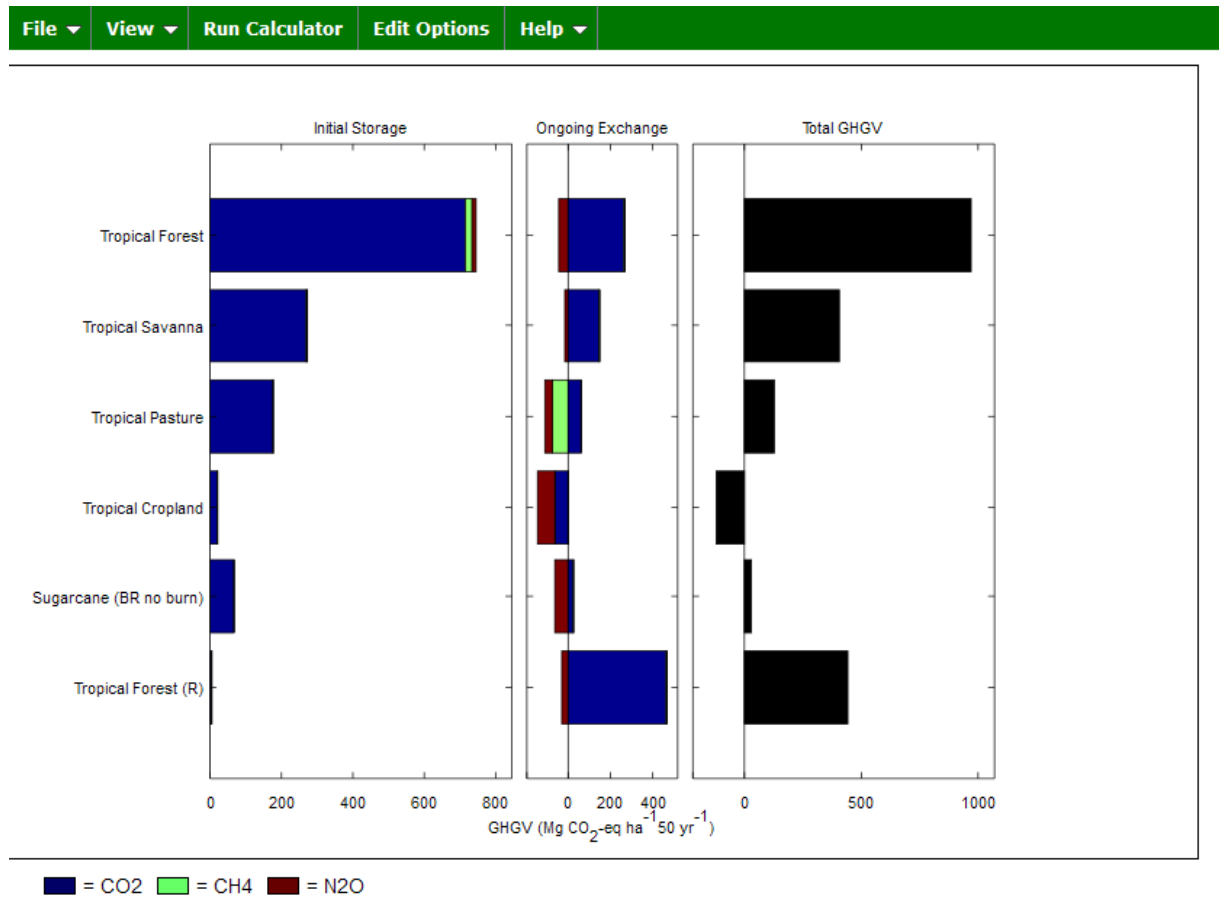
Step 5. Interpreting Results



■ = CO₂ ■ = CH₄ ■ = N₂O

- **Results are presented in units of CO₂-equivalents** per hectare over the selected number of years (50 in this case). In other words, GHGV quantifies how many (metric) tons of CO₂ would have the same effect on climate as clearing one hectare of the ecosystem (and measuring the impacts over the selected time frame).
- **Positive values represent climate benefits** of maintaining the ecosystem, negative values represent climate costs. Conversely, positive values indicate that clearing the ecosystem would be detrimental to climate.

Step 5. Interpreting Results, cont.



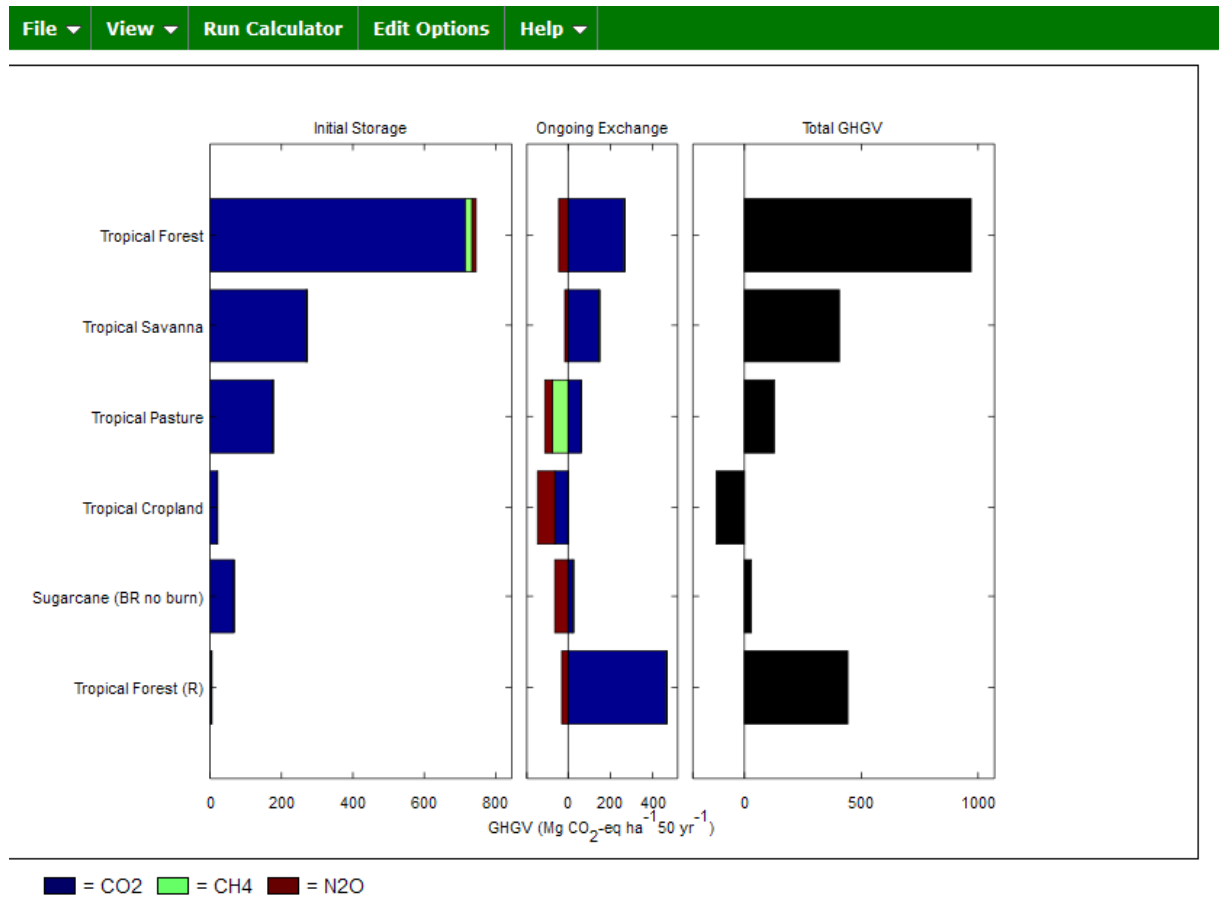
The three panels represent:

*Contribution to GHGV from **initial storage** of organic material.* If the ecosystem is cleared, carbon stored in vegetation, non-living organic material, and soil will be released to the atmosphere as CO₂. If fire is used to clear the ecosystem, other GHGs will also be released (e.g., CH₄, N₂O).

*Contribution to GHGV from displaced from **ongoing exchange** of GHGs between the ecosystem and the atmosphere.* Every year, ecosystems exchange GHGs with the atmosphere. For example, many natural ecosystems take up CO₂ from the atmosphere, and croplands release N₂O as a byproduct of nitrogen fertilization. If the ecosystem is cleared, such GHG exchanges will be displaced. Displaced GHG exchange is counted over the time period of interest (50 years in this case.)

Total GHGV. GHGV is the sum of the contributions from storage and flux. In some cases, the probable effects of disturbance may also be included.

Step 5. Interpreting Results, cont.



GHGV is measured relative to a bare-ground baseline. If you want to compute the full GHG effects of **land use change**, you will take the **difference between *GHGVs* of the new and old ecosystems**.

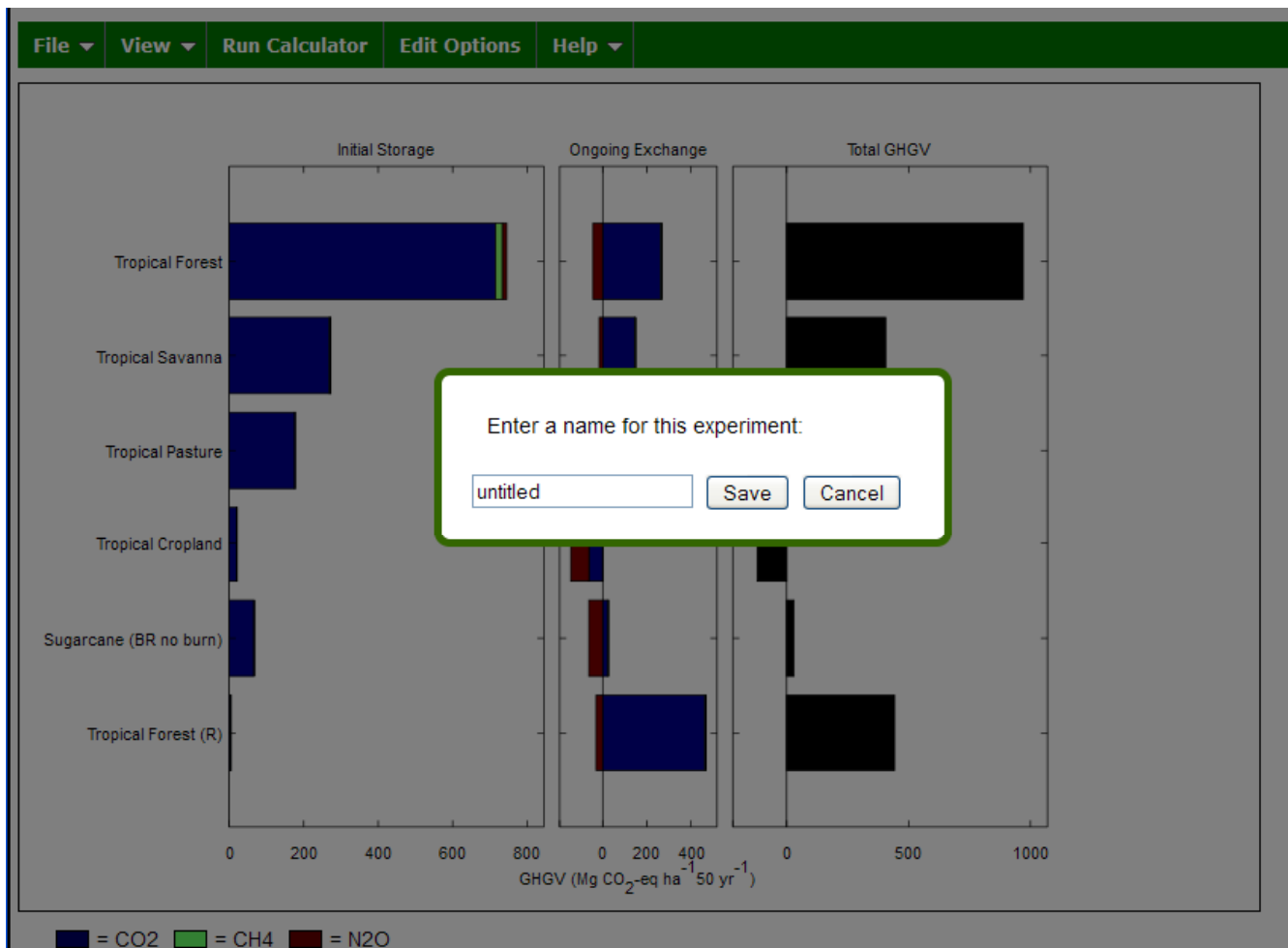
So, for example, the total GHG value of clearing tropical forest to make way for cropland is:

$$\begin{aligned}
 &GHGV_{\text{tropical_cropland}} - GHGV_{\text{tropical_forest}} \\
 &= -85 - 970 \text{ Mg CO}_2\text{-eq /ha over 50 years} \\
 &= -1055 \text{ Mg CO}_2\text{-eq /ha over 50 years}
 \end{aligned}$$

The cost of this land use change is equivalent to releasing >1000 tons of CO₂ to the atmosphere.

Step 6. Save Experiment, if desired.

- Select “File”, “Save Experiment” on the menu bar.



- Name and save your experiment. Later, you can reload it from the same computer by selecting “File”, “Load Experiment” on the menu bar.

Questions or Comments?

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Thank you for using the
Greenhouse Gas Value Calculator!