

Bioenergy Models Mapping System User Guide

Revision 1.2

July 6, 2020

Produced by the National Renewable Energy Laboratory for the U.S. Department of Energy, Energy Efficiency and Renewable Energy, Bioenergy Technologies Office

Table of Contents

Introduction:	1
Public Users:	2
Home Page:	2
Models List:	3
Model Detail.....	4
The Models Map.....	6
Lab Administrator Users	10
Obtaining system authorization	10
Obtaining system access and signing into system.....	10
Creating a Google Account	10
Updating model information.....	15
Adding a new model	19
Responding to requested information.....	22
Appendix - Data Dictionary	23
Data Elements, Selections and Descriptions	23
User Permission Classes	28

Introduction:

The Bioenergy Technologies Office (BETO) Models Mapping System was developed for researchers interested in bioenergy and bioeconomy analysis. Through this tool, users can access an inventory of bioenergy and bioproducts models and tools, key information on each model, and an interactive display of relationships among models.

This model inventory was assembled in 2017 under funding by the U.S. Department of Energy's Bioenergy Technologies Office (BETO) and was updated in 2020. Ongoing model updates are the responsibility of Laboratory model owners. To identify if there have been updates to information about any model, users can contact the lab designated as the model owner for more information.

Models included have been:

- Funded by BETO,
- Historically applied to biomass-to-bioenergy or bioproduct supply chain(s), and
- Have some type of documentation (unless model development began in FY17 or later).

Data compilation tools must not functionally duplicate a model and be accessible by BETO staff upon request.

This site can be viewed on any screen size from a mobile phone to a full-sized desktop monitor. For small screens, the command placement may differ from that shown and described here. Preferred browsers include Firefox and Chrome.

This user guide documents permitted functionality by public, Lab Administrators, BETO users, SI Analysis Lead, and SI-Administrator. An appendix provides data definitions for all data selections permitted in the tool.

Public Users:

Public users can access the homepage, a listing of all models which enable limited sorting and searching, detail model information, a map showing input and output relationships between models, and can send requests for more information.

Home Page:

The home page is accessed through <https://bioenergymodels.nrel.gov/>

As shown in Figure 1, on the home page, three options can be selected from the navigation ribbon near the top of the page and repeated on all pages of site:

- Home: Navigate back to home page.
- Models List: View a [list](#) of BETO models and tools.
- Models Map: Access a [dynamic display](#) of relationships between BETO models and tools.

Call-out boxes towards the bottom of the home page also provide navigation to the models list and the models map as well as a “Contact Us” option for submitting questions or providing feedback.

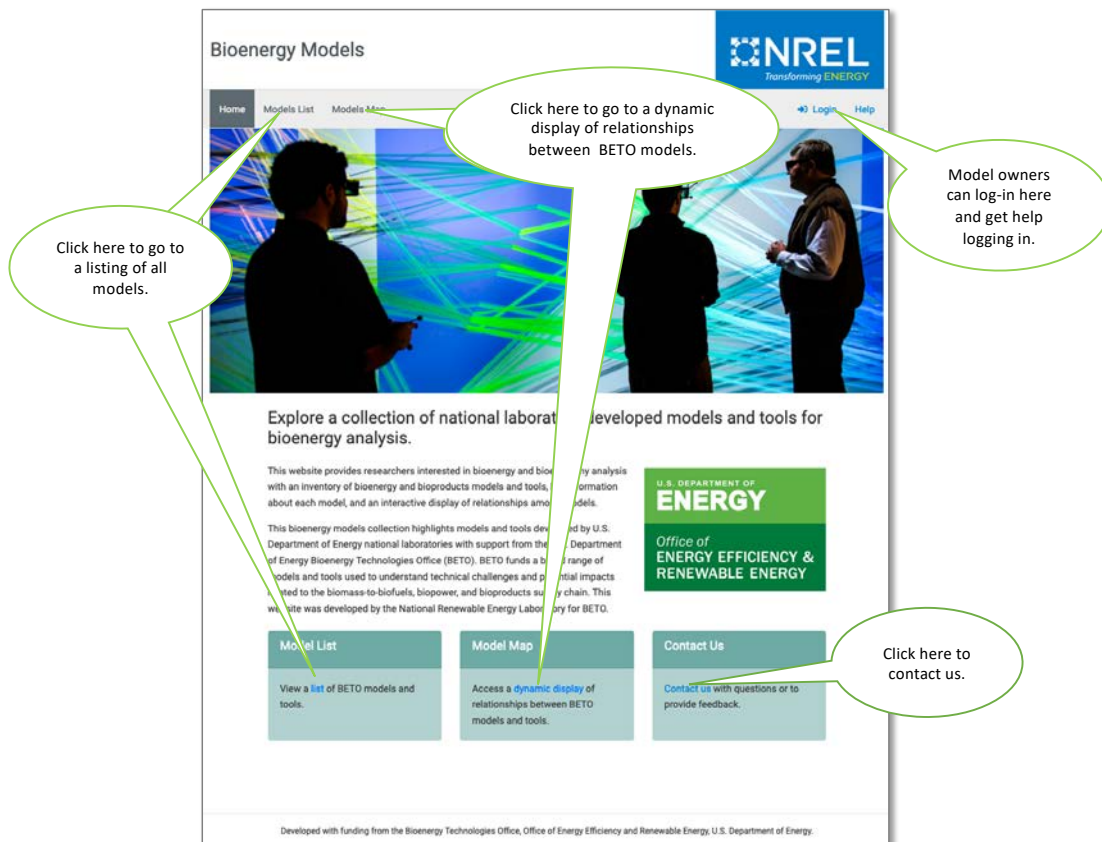


Figure 1: Home Page

Detailed information on each model or tool can be accessed through the models list or the models map by double clicking any model link.

Model owners can access update capabilities through links in the upper right corner of the home page:

- **Login:** Model owner or system administrator log-in for updating existing models and proposing new models.
- **Help:** Contains help for model owners to log into the system and download a copy of this user guide.

Models List:

The models list (Figure 2) shows all models and data tools included in this inventory. The models list includes acronym, name, lab, supply chain element, primary and secondary analytical purpose, and spatial and temporal resolution.

While additional bioenergy models have been developed by other Federal Agencies, DOE Offices, DOE Laboratories, Universities, and other parties, the models included here have been most recently developed under funding by BETO.

Available functions within the Models List include:

Search: Type any text into the search box to return models which contain the search text in any displayed field.

Sort: Click on column headings to sort the list by that column in either ascending or descending order.

Filtering: Click on the supply chain element icons to filter the models list by supply chain element. If no icons are selected, all models are displayed.

With the “and” radio button selected, selecting any supply chain element selects all models that include that supply chain element and selecting multiple supply chain elements shows only models that include all of the selected supply chain elements.

With the “EXACT” radio button selected, selecting any supply chain element will select all models that include ONLY the supply chain element(s) selected.

Selecting a model for full detail: Click on a model name or acronym to access full details for that model.

Scrolling the entire list: With your cursor on the list, scroll down to see the entire list of models.

The screenshot shows the 'Bioenergy Models' listing page. The table contains the following data:

Acronym	Name	Lab	Supply chain	Primary analytical purpose	Secondary analytical purpose	Spatial resolution	Time resolution
AFDC	Alternative Fuels Data Center	NREL	Website				
BAT	Biomass Assessment Tool	PNL	Bio-physical assessments	Feasibility/impl. assessment	Field/Watershed	Hours	
BEEM	Bioeconomy Environmental Extended Input-Output Model	NREL	System level	Life-cycle analysis			
BD-EST	Biodiversity Decision Support Tool	ORNL	Environmental	Database	Field/Watershed		
Bioeconomy ADE	Air emissions, Greenhouse gas emissions, Energy use Model for the Bioeconomy	AHL	System level	Environmental	Regional/Water		
Bioenergy KDF	Bioenergy Knowledge Discovery Framework	ORNL	Website	Database			
Bioproduct Transition SD	Bioproduct Transition System Dynamics Model	NREL	Transitions	Cross-sector analysis	Global	Months	
BUSTAR	Bioenergy Sustainability Target Assessment Resource Tool	NREL	System level	Environmental	Field/Watershed	Years	
Blend	Blending Model	NREL	Feasibility/implementation assessment	Techno-economic analysis	Field/Watershed	Days	
BLM	Biomass Logistics Model	INL	Supply chain logistics	Techno-economic analysis	Regional/Watershed	Years	
BEM	Biomass Economics Model	NREL	Transitions	Cross-sector analysis	National	Years	

Callouts in the image provide the following instructions:

- Click up/down arrows to sort by any column.
- Click here to search for a term within one of the fields shown in the listing of all models.
- Select to filter based on supply chain elements.
- Click on a model name or acronym to see full model detail.

Figure 2: Models List

Model Detail

The model detail page, as shown in Figure 3, provides standardized information about each model. This includes a brief abstract, modeling platform and model type, primary and secondary analytical purposes, metrics, and geospatial and temporal resolution. It also lists the Laboratory model owner, principal investigator, development details including when it was started, last updated, level of development and review, and information on the scope of the model. Scope detail categories include biomass to bioenergy supply chain elements, feedstock types, conversion technologies, end products/process outputs, and transportation market segment.

Scroll down through this information to find a map that shows relationships between this and other BETO models and enables direct click-through navigation to related models. (See instructions for the *Models Map* below for full information on navigating this map.)

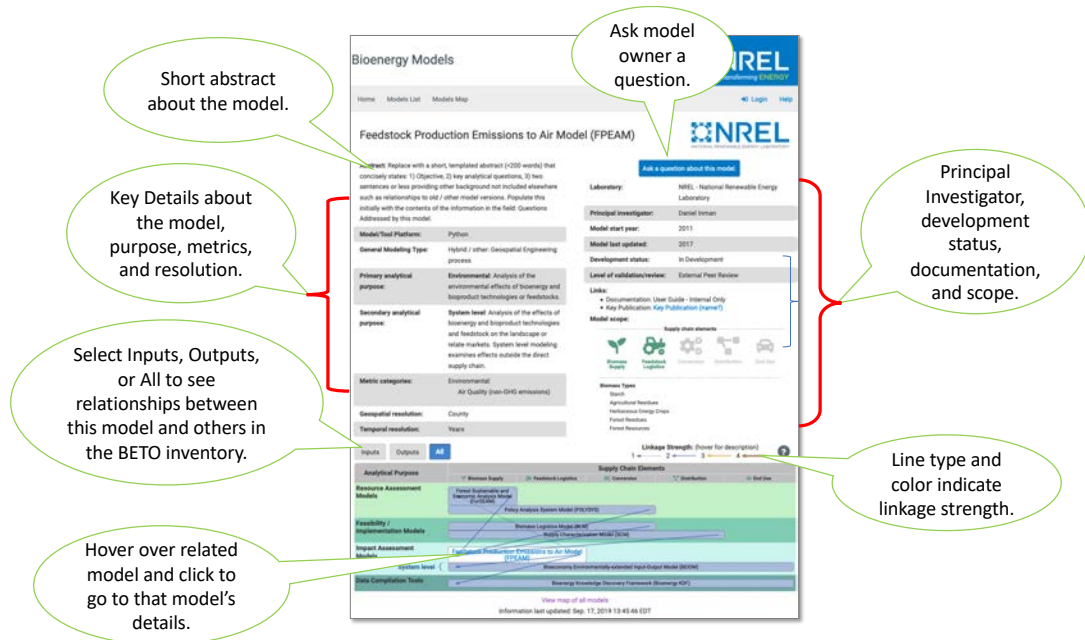


Figure 3: Model Detail

As shown in Figure 3, clicking the button on the upper right side of the detail sheet that says “Ask a question about this model” triggers the dialogue box similar to that shown in Figure 4 that generates an email to the model owner for response.

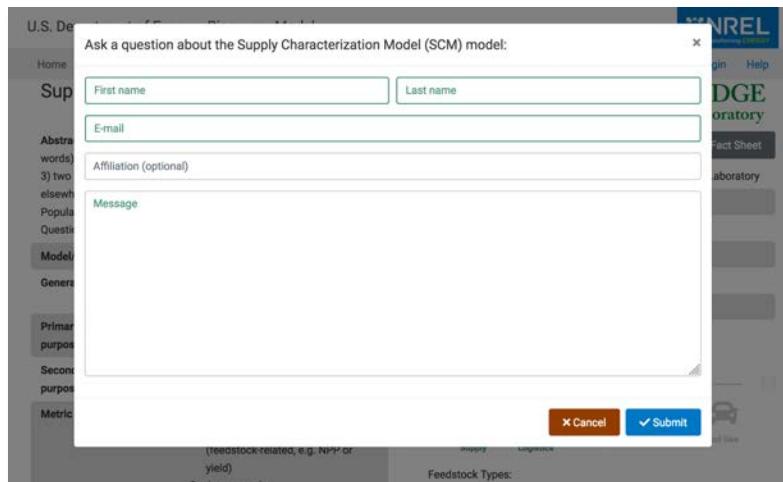


Figure 4: Request Information

The Models Map

The Bioenergy Models Map shown in Figure 5 shows all models included in this inventory organized by their category of analytical purpose on the vertical axis and by supply chain coverage and respective elements on the horizontal axis. Scroll through the list to see all models.

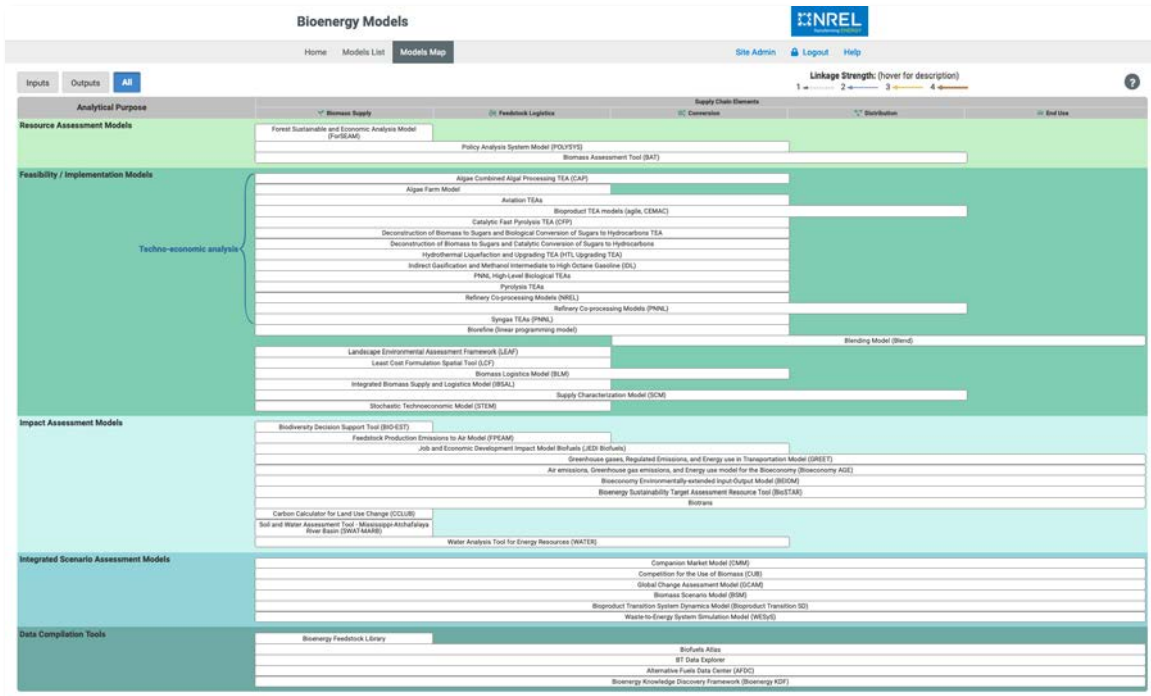


Figure 5: Models Map

Hover over the models (as shown in Figure 6) to explore relationships between models. Lines originating at the right of a model indicate an output from that model. Lines ending at the left of a model indicate an input into that model. Line type and color indicate the types of relationships (the strength of the input or output linkage). The strength of linkage ranges from “No data exchange – calibration or validation only” to “Automated data exchange”. Hover over the legend on the top right of the page for a description of linkage strength.

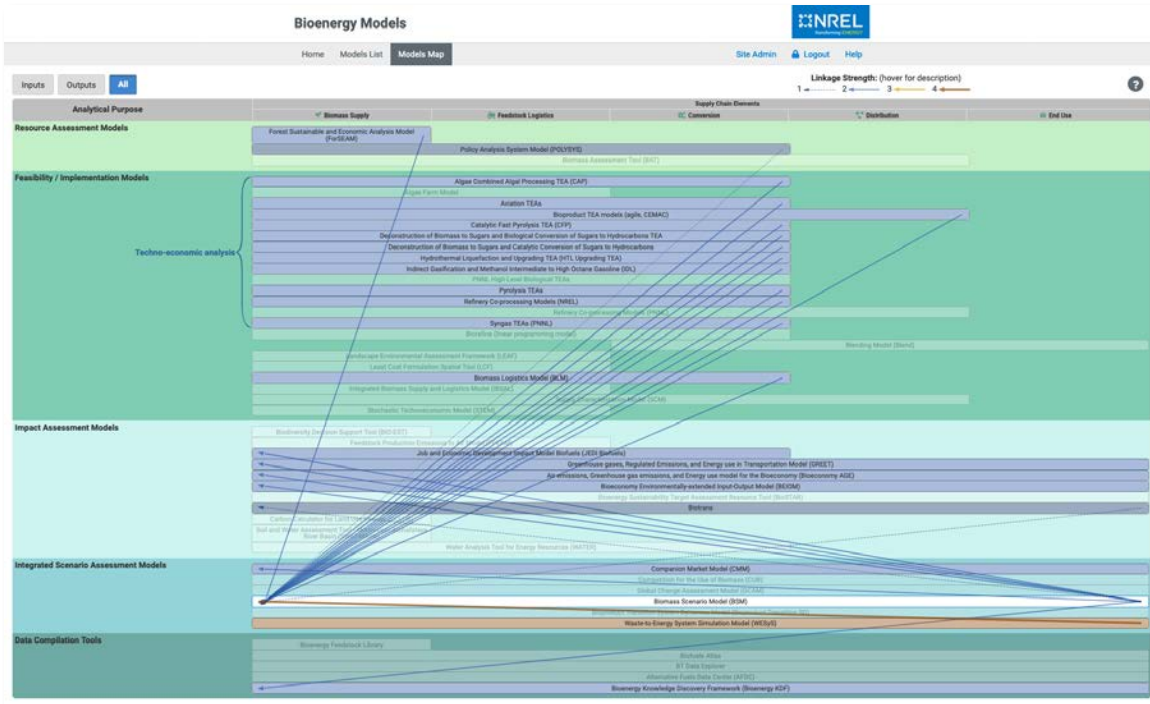


Figure 6: Models Map with hover over links related to the Biomass Scenario Model

Click on the *Inputs* button and hover over a model to show linkages from other models into a selected model as shown in Figure 7.

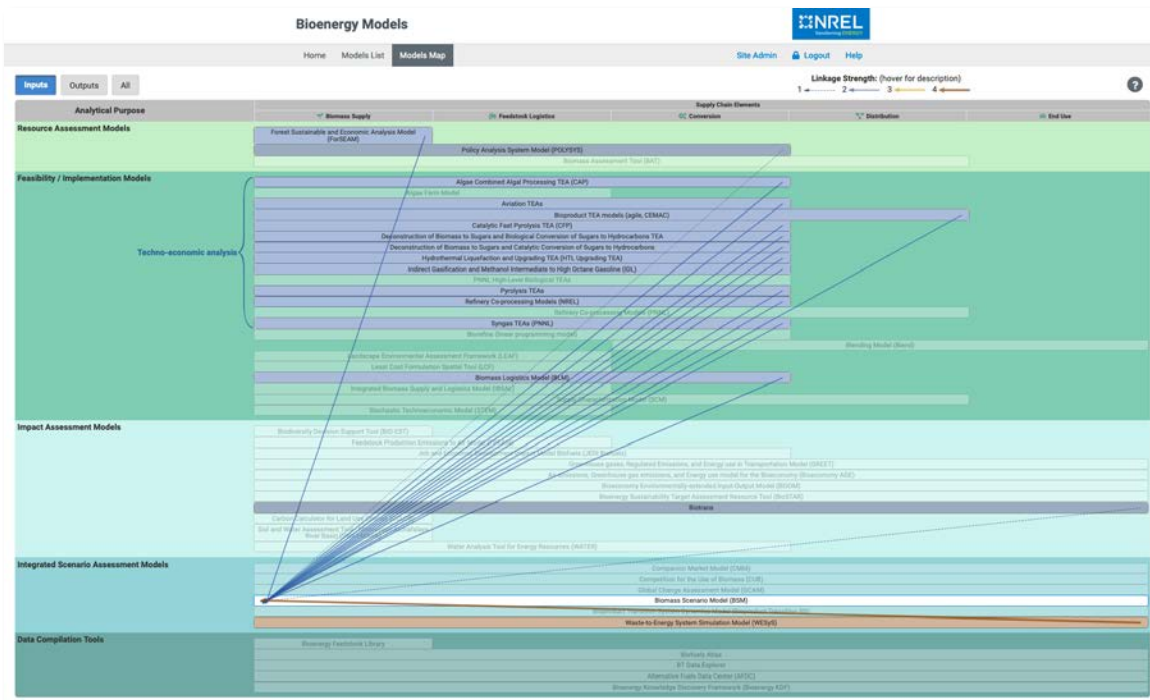


Figure 7: Models Map with hover over inputs links

Click on *Outputs* button and hover over a model to show just models that use the outputs from a selected model as illustrated in Figure 8.

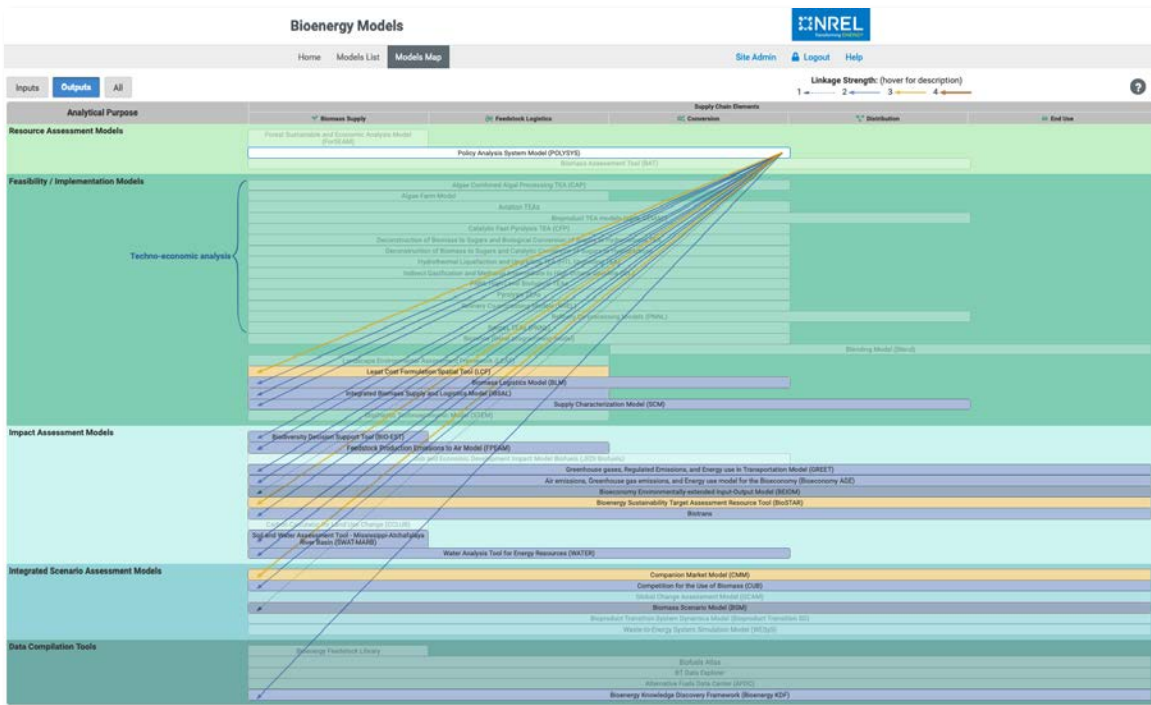


Figure 8: Models Map with hover over outputs links

Click once on a model to hide non-related models. Select the *Inputs* button to see just those models providing inputs as shown in Figure 9.

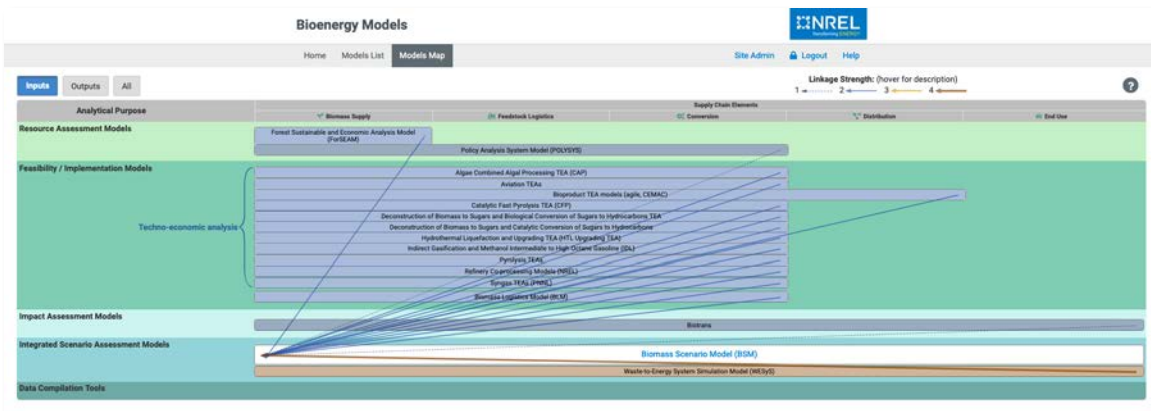


Figure 9: Models Map with hover over input links hiding non-related models

Select the *Outputs* button to see just those model receiving outputs from the selected model as shown in Figure 10.

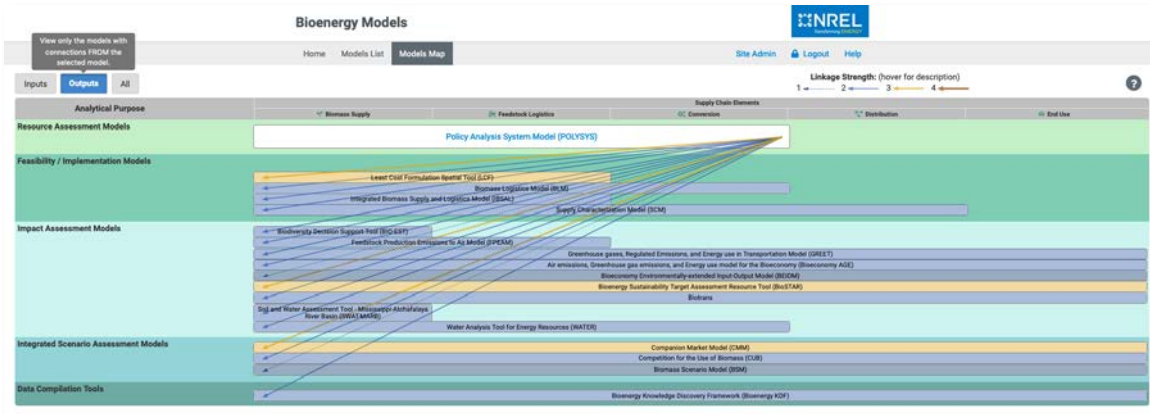


Figure 10: Models Map with hover over output links hiding non-related models

Click on a model and select the *All* button (the default selection) to see the models receiving outputs from and providing inputs into the selected model (Figure 11).

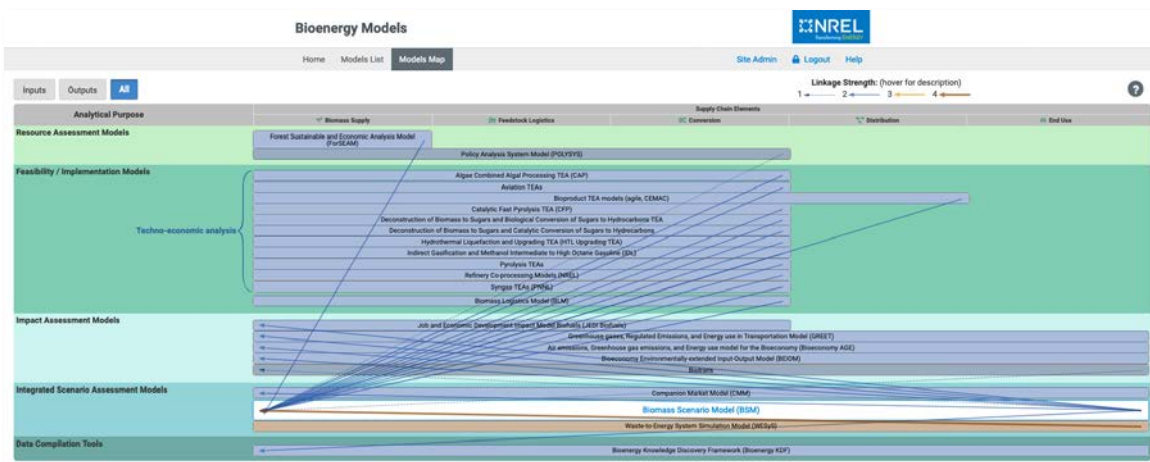


Figure 11: Models Map with hover over input and output links hiding non-related models

Click on any model shown to change to linkages between that model and other BETO models. Click again to go to that model’s detail.

Click anywhere outside of the model map to clear previous selections and return to seeing all models.

Lab Administrator Users

Lab Administrators are designated by the Lab Relationship Manager (LRM) to perform administrative functions on models maintained by their laboratory. This includes maintaining and updating model detail information on all models assigned to that Lab, the ability to create a new record and enter detail information on new models “owned” by that Lab, and directing inquiries generated through the system to the appropriate model owner or LRM. DOE review and approval is required on any new model prior to making related information publicly accessible. Lab administrators are responsible for working with model owners/PIs and their LRM to periodically review and update information on their Lab owned models.

Functions described here include how to obtain system authorization, obtaining system access and signing into the system, updating model information, adding new models, and directing inquiries.

Obtaining system authorization

BETO Lab Relationship Managers (LRM) provide the name and contact information for the person in their lab designated as the Lab Administrator to the SI Analysis Lead or by emailing full details including the name, Lab, email address, and effective date of the change to DOEBioenergyModels@nrel.gov. The Lab administrator and the LRM will receive email notification when access for the Lab Administrator has been set up in the system.

Obtaining system access and signing into system

Once authorization has been granted, in order to update your model(s), you will need to create a Google Account using your official lab e-mail address.

Creating a Google Account

1. First, create a Google Account using your official lab e-mail address. It does not matter if you already have a personal Google account; please follow this procedure to create a new one. The reason for this is that we employ Google for authentication for your security.

You can easily determine if you already have a Google Account associated with your lab account. When you click the Login button above, type your lab e-mail into the box labeled "e-mail or phone," then click "Next". (Figure 12)

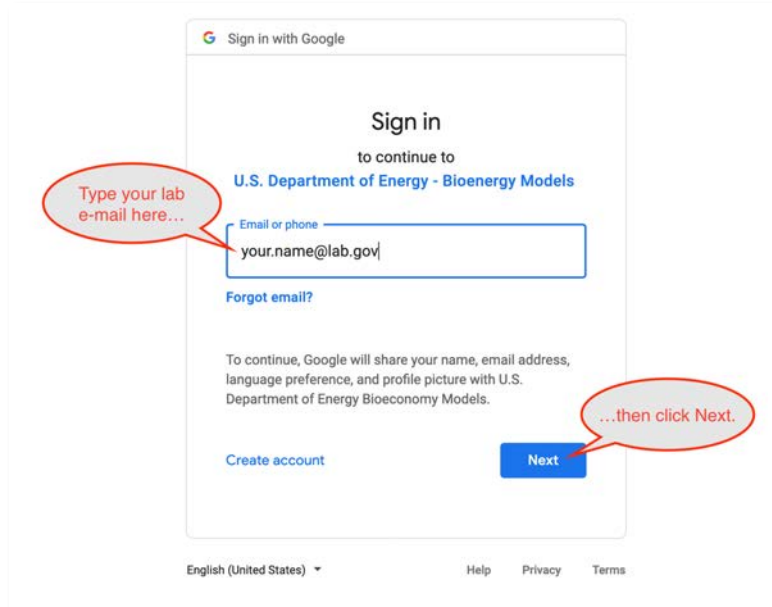


Figure 12: Create a Google Account

2. If you get the error message, "Couldn't find your Google Account," please click the "Create Account" link at the bottom left of the screen: (Figure 13)

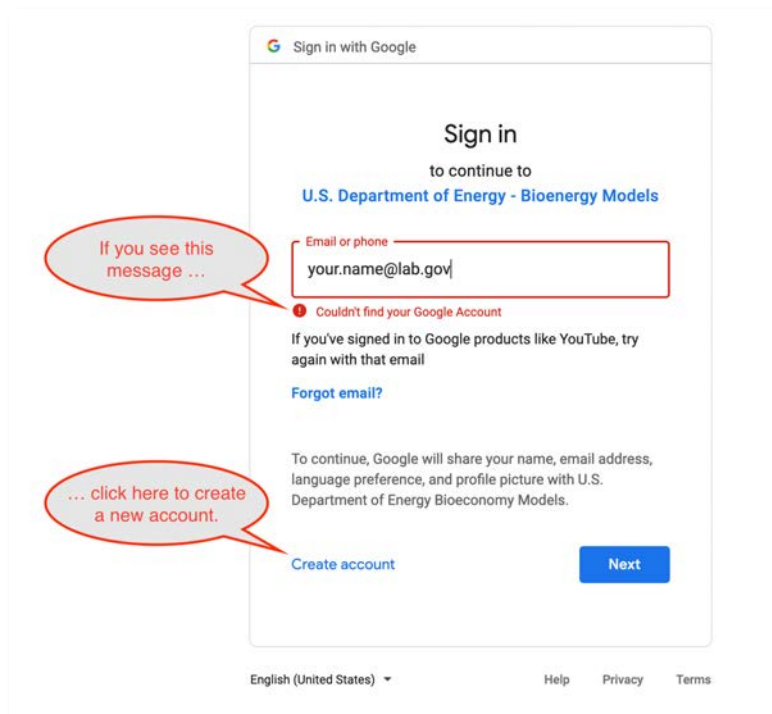
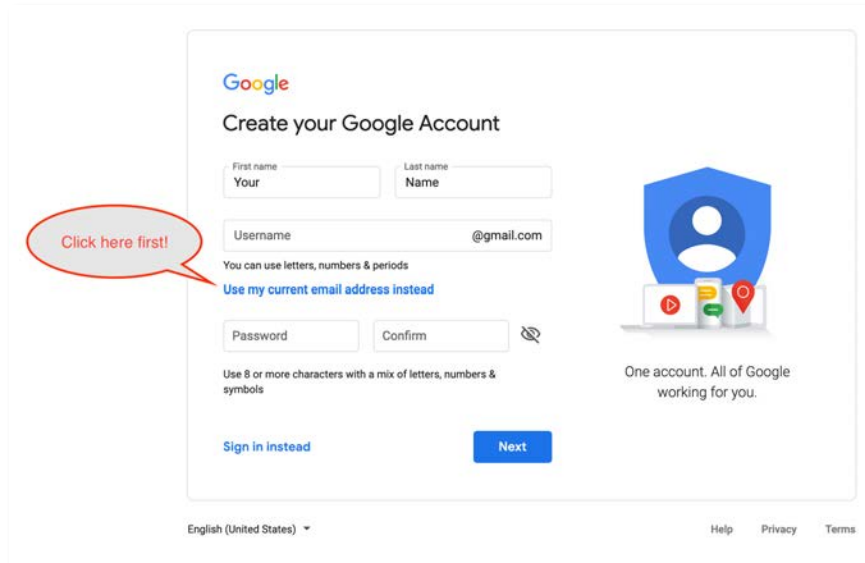


Figure 13: Creating a Google Account – If you get an error

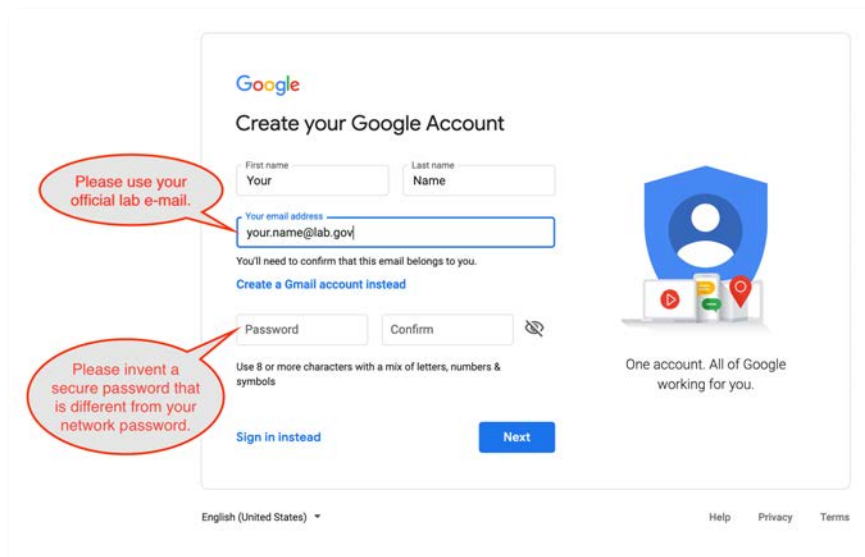
3. Type your first and last name (we used "Your Name" as an example) and be sure to click the "Use my current email address instead" link. Creating an @gmail.com account will not work, because we require you to use your official lab e-mail to verify your identity. (Figure 14)



The screenshot shows the Google Account creation interface. The title is "Create your Google Account". There are input fields for "First name" (containing "Your") and "Last name" (containing "Name"). Below these is a "Username" field with "@gmail.com" as a placeholder. A red speech bubble points to the "Use my current email address instead" link, with the text "Click here first!". There are also "Password" and "Confirm" fields. A "Next" button is at the bottom right. The page footer includes "English (United States)", "Help", "Privacy", and "Terms".

Figure 14: Create a Google Account – Use current email address instead

4. Enter your official lab e-mail address and invent a secure password. For your security, this password should be different from your network or other account passwords. (Figure 15)



The screenshot shows the Google Account creation interface. The title is "Create your Google Account". There are input fields for "First name" (containing "Your") and "Last name" (containing "Name"). Below these is a "Your email address" field containing "your.name@lab.gov". A red speech bubble points to this field with the text "Please use your official lab e-mail.". There are also "Password" and "Confirm" fields. A second red speech bubble points to the "Password" field with the text "Please invent a secure password that is different from your network password.". A "Next" button is at the bottom right. The page footer includes "English (United States)", "Help", "Privacy", and "Terms".

Figure 15: Create a Google Account – Invent a new secure password

5. Check your lab e-mail. You will receive an e-mail from Google that looks like the following picture. It will include a verification code (usually 6 digits). (Figure 16)

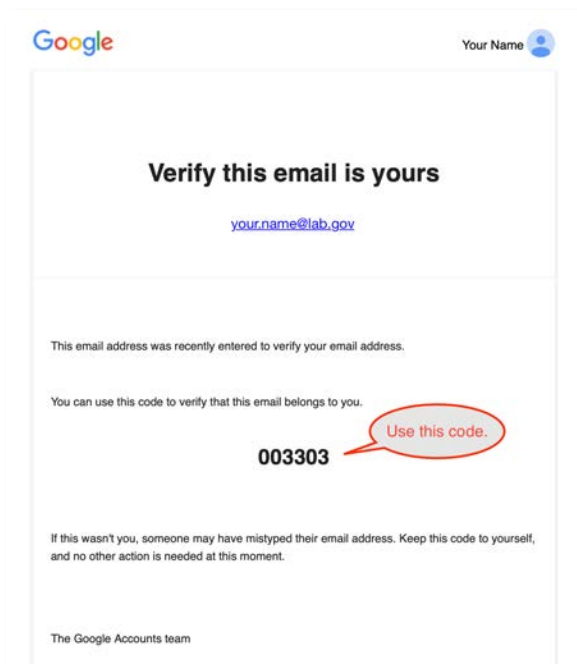


Figure 16: Create a Google Account – Verify email

6. Please switch back to your browser and type the 6-digit verification code. (Figure 17)

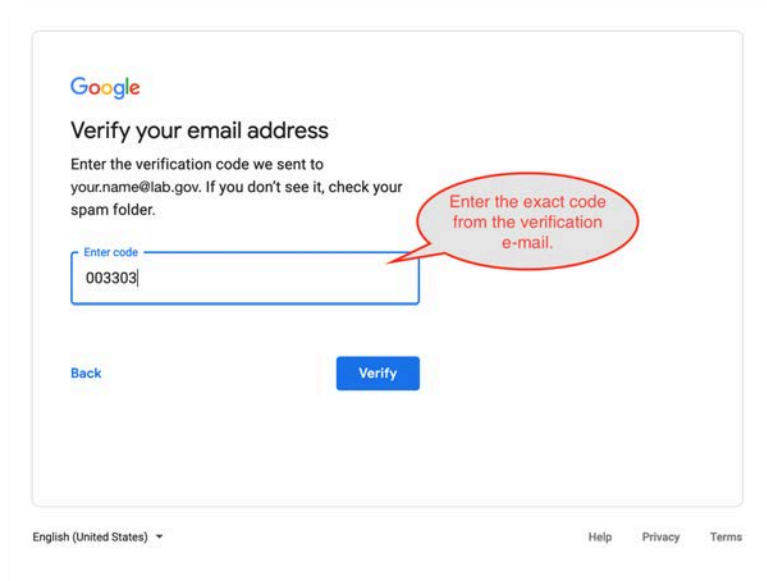


Figure 17: Create a Google Account – verify email step 2

7. The final step requires you to provide your gender and date of birth. This information is required by Google. Please click "Why we ask for this information" for details. You may optionally enter a mobile number to use to reset your password in the event it is forgotten. (Figure 18)

The screenshot shows the Google account creation final step. At the top, it says "Google" and "Your, welcome to Google". Below that is a profile icon and the email address "your.name@lab.gov". There is a field for "Phone number (optional)" with a US flag icon. A note states: "We'll use your number for account security. It won't be visible to others." Below this are fields for "Month", "Day", and "Year" under the heading "Your birthday". There is a "Gender" dropdown menu. A red speech bubble points to a link that says "Why we ask for this information". At the bottom are "Back" and "Next" buttons. On the right side, there is an illustration of a shield with a lock and a birthday cake, with the text "Your personal info is private & safe". At the very bottom, it says "English (United States)" and links for "Help", "Privacy", and "Terms".

Figure 18: Create a Google Account final step

8. You're all set! Once we set up your account on our end, you will be able to log in and edit your models using your new Google Account.

For further help, please contact DOEBioenergyModels@nrel.gov.

Updating model information

To edit detail model information, click on the *Edit Model* button as shown in Figure 19. The User Guide Appendix includes a full data dictionary with a description and/or data selections for each field.

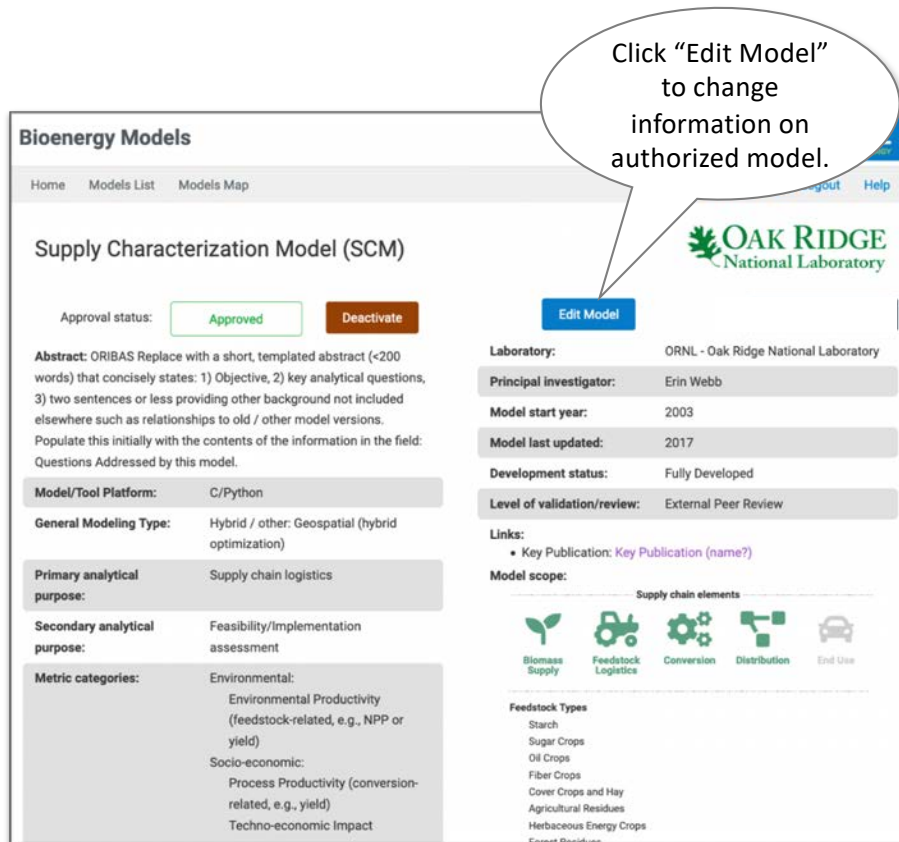


Figure 19: Edit model detail

As shown in Figure 20, enter or update the model name, acronym, abstract, and model/tool platform. The abstract should be a concise, under-200-word description that does not duplicate other information provided and provides objectives, key questions, and other useful background information.

Select general modeling type from the drop-down list. If you select *Hybrid/other* for general modeling type, a box will appear for you to enter a description. If the model PI has changed, select existing contacts from the drop-down list or quick add a new contact for your lab. Select other categories from drop-down lists and select supply chain elements covered by your model. Note: supply chain elements must be sequential.

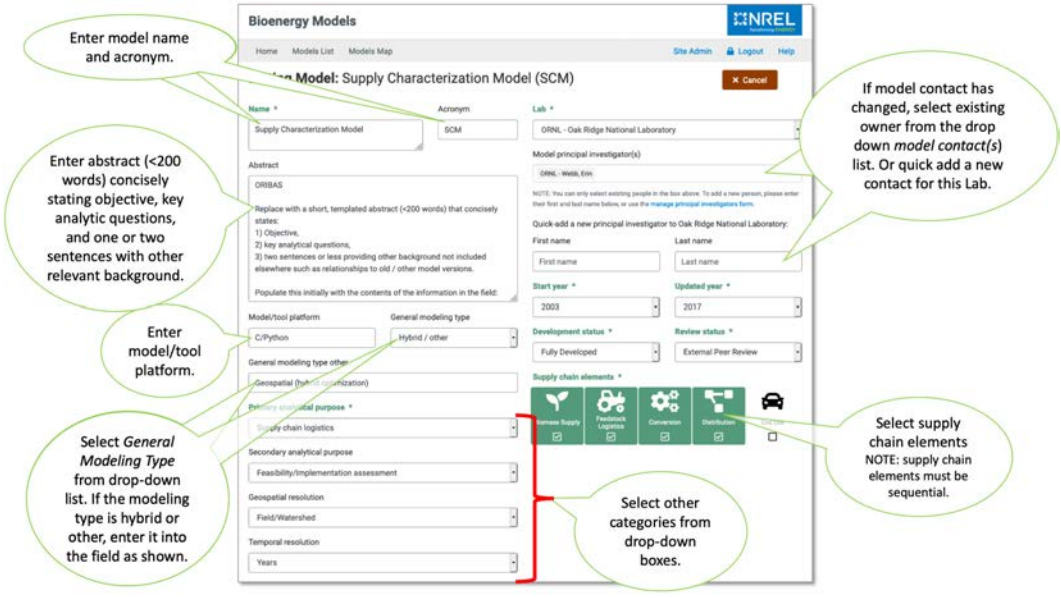


Figure 20: Edit Model detail – key fields

Select all metric and model scope categories that apply to your model. (Figure 21)

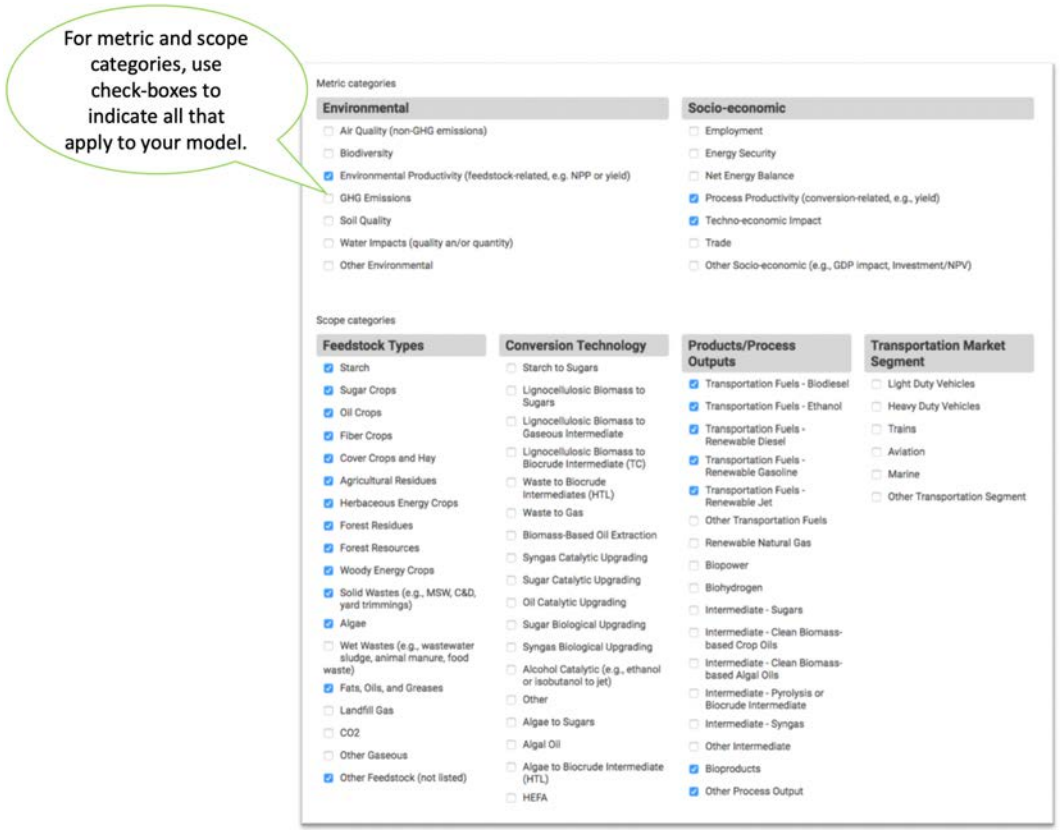


Figure 21: Edit Model detail – scope detail

Figure 22 shows the field entry for links and input relationships.

Enter information in the *Links* section. Drop down list selections include *Documentation*, *Publication*, or *Website*. For *Documentation*, include the title (in the *Title* field) with links to any available user guide. If there is only internal documentation or user guide, select *Documentation* and enter into the *Title* field “*Internal User Guide*” or other appropriate language. For key publications or websites, select the appropriate selection, enter the title of the publication or website, and insert the corresponding URL link.

From the drop-down list, select all input relationships with other BETO inventoried models. Select the *Ease of Connection* category that best describes the relationships between this input model/tool and your tool.

The screenshot displays two main sections: 'Links' and 'Input Relationships'. The 'Links' section contains a table with columns for 'Type', 'Title', 'Link URL', and 'Delete'. The 'Input Relationships' section contains a table with columns for 'From model', 'Ease of connection', and 'Delete'. Callout boxes provide instructions: 'Enter information on Documentation, Key Publications, and Website. Select type from the drop down list, enter a Title (which will show as a hot link), and a URL.(If appropriate).', 'Select Input models from drop-down list. Only other BETO models are available.', 'If you use all of the empty selections, save, and more selections will appear.', 'Select type of link based on ease of connection between the input model and your model.', and 'Save your changes by clicking Update + View or Update + Edit. To exit without saving changes click Cancel.' At the bottom, there are three buttons: 'Update + View', 'Update + Edit', and 'Cancel'.

Type	Title	Link URL	Delete
Key Publication	Key Publication (name?)	https://energy.gov/eere/bioenergy/download	Delete
---	Title	Link URL	Delete
---	Title	Link URL	Delete
---	Title	Link URL	Delete

From model	Ease of connection	Delete
Policy Analysis System Model (POLYSYS)	Manual data exchange with data manipulator	Delete
Integrated Biomass Supply and Logistics Model (IBSAL)	Manual data exchange with data manipulator	Delete
Forest Sustainable and Economic Analysis Model (ForSEAM)	Manual data exchange with data manipulator	Delete
Biomass Logistics Model (BLM)	Manual data exchange with data manipulator	Delete
---	---	Delete
---	---	Delete
---	---	Delete

Figure 22: Edit Model detail – links and relationships

Save your changes by selecting the *Update + View* or *Update + Edit* button. To leave this page without saving, select *Cancel*.

If any mandatory fields (indicated with an asterisk) are left blank, or there is an error in a link, you will receive an error message as shown in Figure 23 and the field in error will be highlighted. Add/correct the field and select *Update + Edit* or *Update + View* to complete the update.

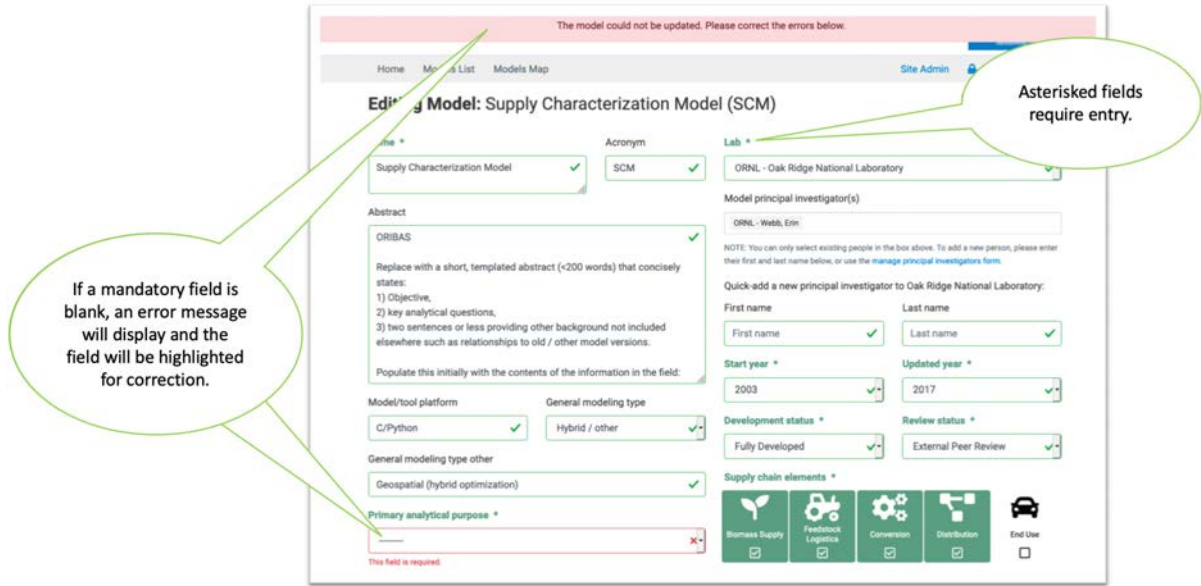


Figure 23: Edit Model detail – error message

Adding a new model

NOTE: any model added is subject to approval by BETO. Please obtain permissions and notify NREL-SI when adding a new model.

To add a new model to the inventory, navigate to the models list and log-in using your owner credentials. Click on “Create Model” button (Figure 24).

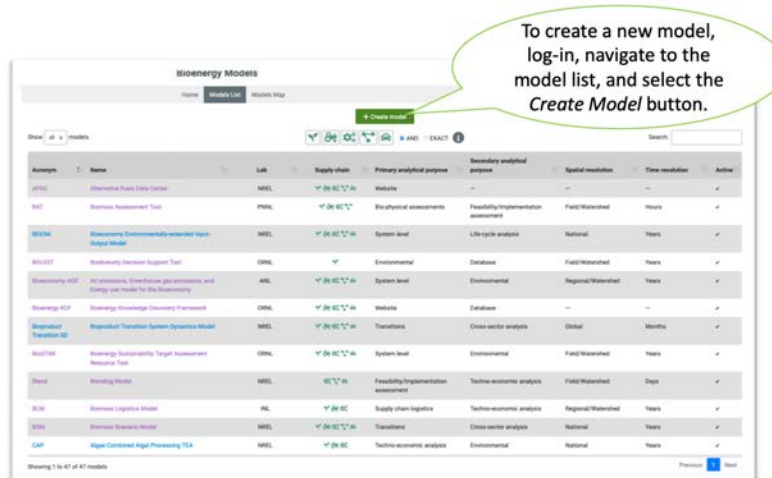


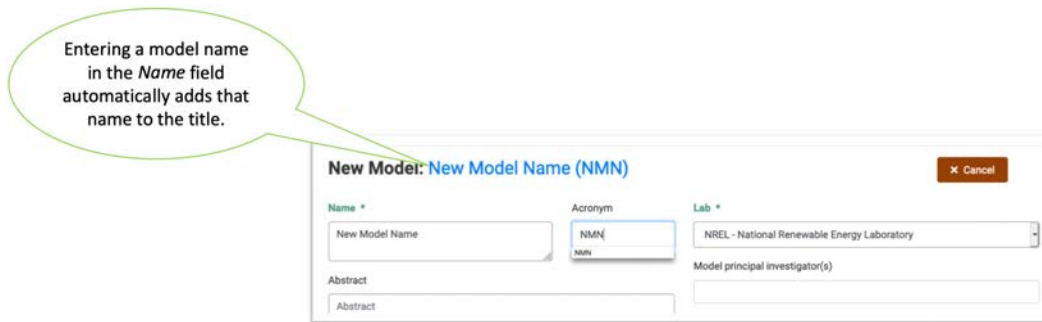
Figure 24: Creating New Model

A blank input form as shown in Figure 25 will provide spaces for inputting all information on this new model. Pay special attention to entering the fields indicated with an asterisk (*) as these are mandatory fields and omitting entries for these fields will result in an error.

The screenshot shows the 'New Model' form. It includes a 'Cancel' button at the top right. The form has several sections: 'Name *' with a text input field; 'Acronym' with a text input field; 'Lab *' with a dropdown menu showing 'NREL - National Renewable Energy Laboratory'; 'Model principal investigator(s)' with a text input field; 'Abstract' with a large text area; 'Model/tool platform' with a dropdown menu; 'General modeling type' with a dropdown menu; 'Primary analytical purpose *' with a dropdown menu; 'Secondary analytical purpose' with a dropdown menu; 'Development status *' with a dropdown menu; 'Review status *' with a dropdown menu; and 'Supply chain elements *' with a row of five checkboxes: 'Biomass Supply', 'Feedstock Logistics', 'Conversion', 'Distribution', and 'End Use', all of which are checked.

Figure 25: Create New Model blank form

As you enter the name for the new model, that name appears next to the *New Model* label. (Figure 26)



Entering a model name in the *Name* field automatically adds that name to the title.

New Model: New Model Name (NMN) ✕ Cancel

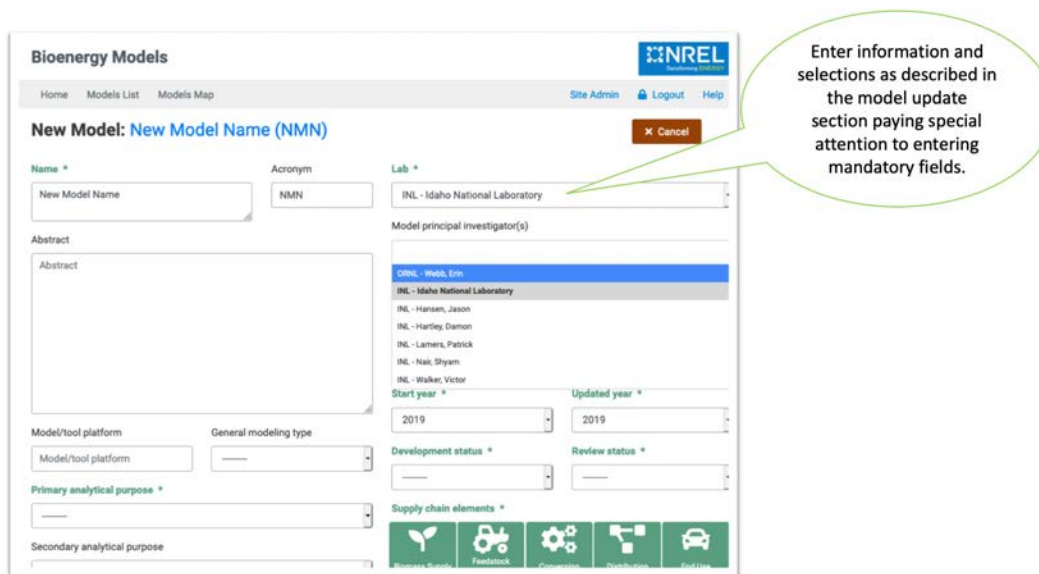
Name * Acronym Lab *

Abstract

Model principal investigator(s)

Figure 26: Create New Model - enter name

Enter all information and make all selections as described in the model update instructions (Figure 27). If you have questions, contact your BETO technology manager or NREL SI Analysis contact.



Enter information and selections as described in the model update section paying special attention to entering mandatory fields.

Bioenergy Models NREL

Home Models List Models Map Site Admin Logout Help

New Model: New Model Name (NMN) ✕ Cancel

Name * Acronym Lab *

Abstract

Model principal investigator(s)

Start year * Updated year *

Development status * Review status *

Supply chain elements *

Model/tool platform General modeling type

Primary analytical purpose *

Secondary analytical purpose

Figure 27: Create New Model - enter fields described in model update section

After completing all selections, inputting all links, and indicating all input relationships, be sure to save your changes by selecting either the *Create+View* or *Create+Edit* button (Figure 28).

The " model can accept (as input) outputs from the following models:

From model	Ease of connection	To
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

Mandatory fields are marked with an asterisk *

Buttons: [Create + View](#) [Create + Edit](#) [X Cancel](#)

Footer: The National Renewable Energy Laboratory is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy.

Navigation: HOME | RESEARCH (Advanced Manufacturing, Bioenergy Buildings, Energy Systems Integration Facility, Geothermal) | Materials Science (Solar, Transportation) | FOLLOW NREL

Figure 28: Create New Model save changes

If you have omitted any mandatory fields or have entered an invalid link, you will receive an error message and the erroneous field will be indicated. Fix that entry and resave. NOTE: the new model will NOT show in the models listing or models map until it has been approved by BETO. To ensure prompt consideration of any new models, please notify NREL-SI Analysis and your BETO TM that this model record has been created.

Responding to requested information

Public users of this system can generate requests for information or provide feedback via a dialogue box that generates an email to the Laboratory Administrator for that model and to the SI Administrator. The Lab Administrator is responsible for forwarding this email to the person currently responsible for that model as well as following up to ensure a response within two weeks. Please cc: the SI Administrator at DOEBioenergyModels@nrel.gov on any response. Requests will be logged and reported to DOE on a quarterly basis.

Appendix - Data Dictionary

Data Elements, Selections and Descriptions

Data Element	Data Selections	Comments / Descriptions
Abstract:		200 words or less that concisely states, for the subject model, 1) objective, 2) key analytic questions, and 3) two or three sentences providing other background not included elsewhere such as relationships to old/other model versions.
Model/Tool Platform		Free form entry of platform or modeling tool used.
General Modeling Type	Accounting/Inventory Agent-Based Dynamic (with feedbacks) Dynamic (without feedbacks) Engineering process Game theoretic Geospatial Optimization (linear) Optimization (non-linear) Statistical Hybrid/Other Other	

Analytic Purpose		
Category	Analytical Purpose Type	Description
Feedstock Resource Assessment Models	Feedstock market assessment	Assessment of potential feedstock resources using an approach that evaluates the market sector producing the feedstock (e.g., agriculture or forestry).
	Bio-physical assessment	Assessment of potential feedstock resources based on the bio-physical properties of the feedstock/landscape and/or technical assessment of resources based on supply chains can access.
Feasibility / Implementation Models	Techno-economic analysis (TEA)	Technical and economic analysis of technologies or systems of technologies.
	Feasibility/ Implementation assessment	Assessment of the feasibility or implementation of technologies and feedstocks in terms of operations or in the context of their landscape or market.
	Supply Chain Logistics	Assessment of the implementation or design of supply chain logistics.
	Risk/financial analysis	Analysis of the risks and financial aspects of technology or feedstock implementation.
Impact Assessment Models	Environmental	Analysis of the environmental effects of bioenergy and bioproduct technologies or feedstocks.
	Socio-economic	Analysis of the economic or social effects of bioenergy and bioproduct technologies or feedstocks.
	Life-cycle analysis	Analysis of the environmental, social, or economics effects of bioenergy and bioproduct technologies across their entire lifecycle.
	System Level	Analysis of the effects of bioenergy and bioproduct technologies and feedstock on the landscape or relate markets. System level modeling examines effects outside the direct supply chain.
Integrated Scenario Assessment Models	Cross-sector analysis	Integrative scenario assessment of the interactions across parts of the supply chain or multiple market sectors.
	Transitions	Integrative scenario assessment of how supply chains or full market sectors transition overtime.
	Scenario optimizations	Integrative scenario assessment examining optimization across the supply chain or multiple market sectors.
Data Compilation Tools	Database	Database that is public or could be made public to facilitate modeling and analysis.
	Website	Online tools.

Metric Categories		
	Data Selections	Comments / Descriptions
Environmental	Air Quality (non-GHG emissions) Biodiversity Environmental Productivity (feedstock-related, e.g., NPP or yield) GHG emissions Soil Quality Water Impacts (quality and/or quantity) Other Environmental	
Socio-economic	Employment Energy Security Net Energy Balance Process Productivity (conversion-related, e.g., yield) Techno-economic impact Trade Other Socio-economic (e.g., GDP impact, investment/NPV)	

Data Element	Data Selections	Comments / Descriptions
Geospatial Resolution	Field/Watershed County Regional/Watershed State National Global	
Temporal Resolution	Minutes Hours Days Months Years Decades	
Model Start Year		Year the model began development.
Model Last Updated		Year the model was last updated.
Development Status	In development Fully developed with periodic updates Fully developed – no updates planned	Select this for newly developed models. Select this for models expected to be updated. Select this for models that are not planned for future updates.
Level of Validation/ Review	External Peer Review External Peer Review/Publicly Released Internal QA/QC or Peer Review	

Links	Documentation	User guide (internal or public)
	Key Publication Website	Link to publication Link to website
Model Scope		
Data Element	Data Selections	Comments / Descriptions
Supply Chain Elements	Biomass Supply Feedstock Logistics Conversion Distribution End Use	
Feedstock Types	Starch Sugar Crops Oil Crops Fiber Crops Cover Crops and Hay Agricultural Residues Herbaceous Energy Crops Forest Residues Forest Resources Woody Energy Crops Solid Wastes (e.g., MSW, C&D, yard trimmings) Algae Wet Wastes (e.g., wastewater sludge, animal manure, food waste) Fats, Oils, and Greases Landfill Gas CO2 Other Gaseous Other Feedstock (not listed)	
Conversion Technology	Starch to Sugars Lignocellulosic Biomass to Sugars Lignocellulosic Biomass to Gaseous Intermediate Lignocellulosic Biomass to Biocrude Intermediate (TC) Waste to Biocrude Intermediate (HTL) Waste to Gaseous Intermediate Biomass-Based Oil Extraction Syngas Catalytic Upgrading Sugar Catalytic Upgrading Oil Catalytic Upgrading Sugar Biological Upgrading Syngas Biological Upgrading Alcohol Catalytic (e.g., ethanol or isobutanol to jet) Algae to Sugars Algal Oil Algae to Biocrude Intermediate (HTL) HEFA	

	Other	
--	-------	--

Data Element	Data Selections	Comments / Descriptions
Products/ Process Outputs	Transportation Fuels – Biodiesel Transportation Fuels – Ethanol Transportation Fuels – Renewable Diesel Transportation Fuels – Renewable Gasoline Transportation Fuels – Renewable Jet Other Transportation Fuels Renewable Natural Gas Biopower Biohydrogen Intermediate – Sugars Intermediate – Clean Biomass-based Crop Oils Intermediate – Clean Biomass-based Algal Oils Intermediate – Pyrolysis or Biocrude Intermediate Intermediate – Syngas Other Intermediate Bioproducts Other Process Output	
Transportation Market Segment	Light Duty Vehicles Heavy Duty Vehicles Trains Aviation Marine Other Transportation Segment	
Model Linkage Strength / Ease of Connection	No data exchange – calibration and validation only Manual data exchange with data manipulation Manual data exchange with no data manipulation Automated data exchange	

User Permission Classes

Permission Status	Definition	System Users assigned permission status
SI status	Designates the user to receive model approval notification emails, enables this user to create, edit, or approve any model, PI/contact, or lab in the front-end user interface and to update or change data definitions.	SI Administrator and SI Systems Analysis Lead
Active	Designates whether this user should be treated as active. Unselect instead of deleting user accounts.	All active users (SI Administrator, SI Analysis Lead, BETO staff, Lab Administrators)
Staff Status	Designates whether this user can log into the administration site, make changes or updates to information on models for their lab , and create a new model for their lab.	Lab Administrators
Superuser Status	Designates that this user has all permissions without explicitly assigning them.	System developers.