



# **T21-North America A Simple User Manual**

## A Quick Introduction to the Model:

The T21-North America project started in 2004, with the construction of the T21-USA model. This model was created by the Millennium Institute to inform and educate the people of the United States, especially policy-makers. Its primary purpose is to show how energy issues are interconnected with society economy and the environment.

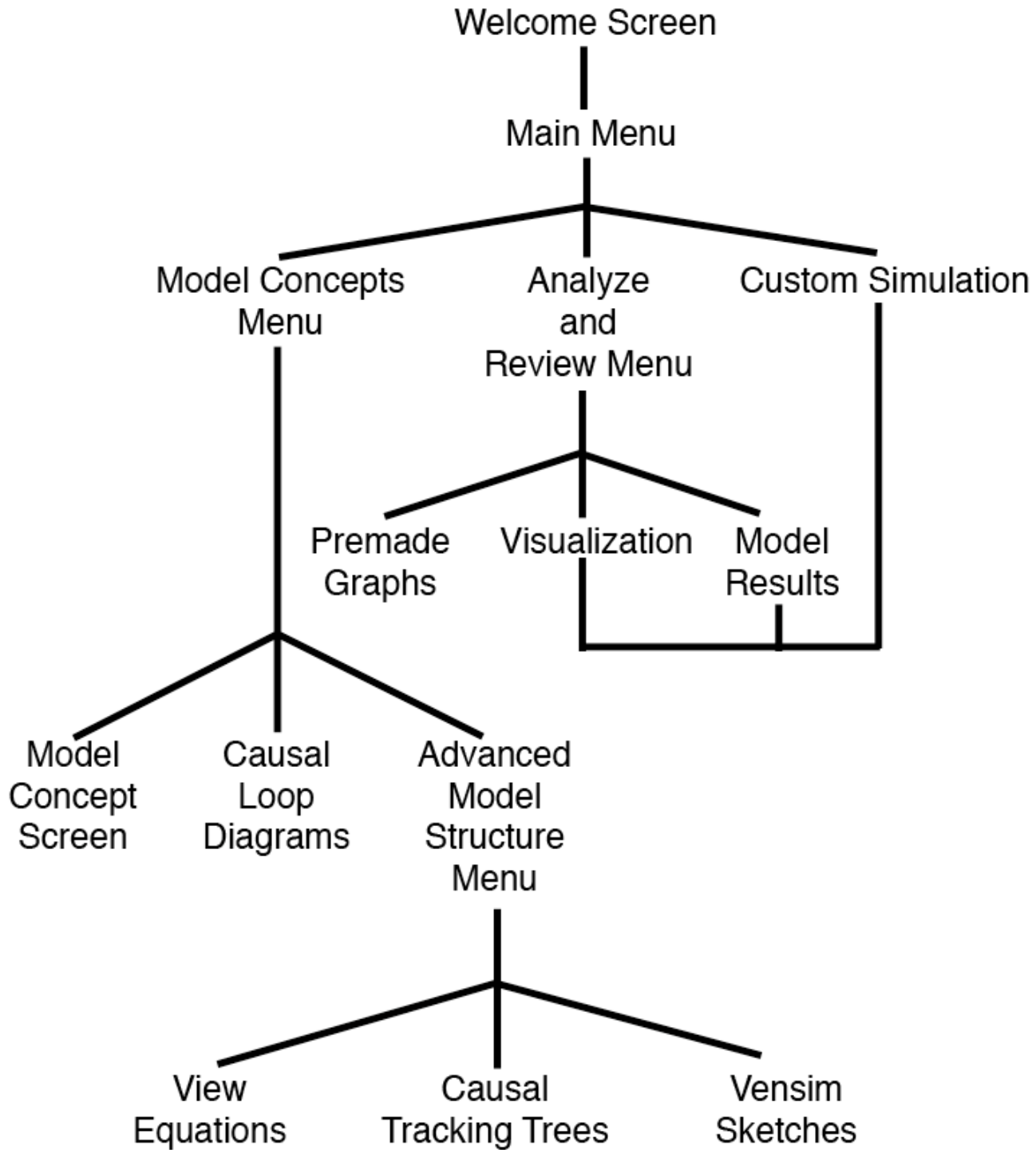
The T21-North America project started out of this initial USA model in May 2006 with the construction of two more small country models of Canada and Mexico. ASPO-USA was the main supporter of this project providing funding and expertise, which was incorporated into the T21-North America model and its base scenario that we present today.

T21 represents over twenty years worth of experience by the Millennium Institute in model construction, starting with the creation of the original T21 framework. SUNY ESF has also contributed to the formation of the energy sectors of the T21-North America model, helping to explicitly calculate Energy Return on Investment within the model.

T21- North America is a System Dynamics model that attempts to understand and represent how the underlying forces of the system define its behavior. This is done so that the model can still give valid results when there are large changes from the status quo. This model was constructed by first understanding the basic causal feedback loops in between the three major sectors: society, economy and environment. Then the model has a strong energy core, which affects all three sectors strongly to ensure the model is rooted within reality.

We encourage you to study this model and use it as much as you can in your own life. As always if you find what appear to be errors or mistakes please contact us at [ab@millenium-institute.org](mailto:ab@millenium-institute.org). If you have any issues or concerns specifically about the model interface please e-mail [waschoen@syr.edu](mailto:waschoen@syr.edu) or [bobbypowers@gmail.com](mailto:bobbypowers@gmail.com) and we will be sure to respond to your questions as soon as we can. Thank you for downloading our model and enjoy!

## T21-North America Interface Flow Diagram



## Welcome Screen



This is the Welcome Screen, it is the first screen shown after T21-North America opens. To enter the program press the large button in the center. This button will lead to the main menu.

## Main Menu



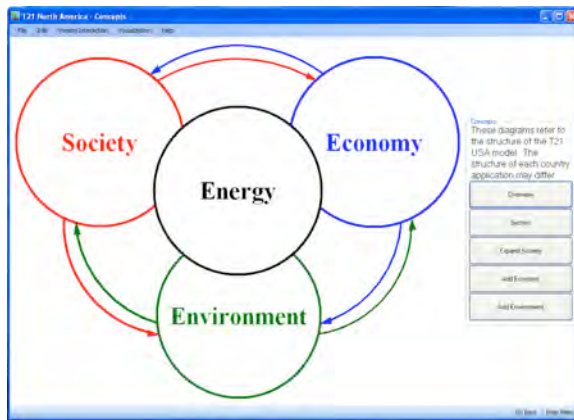
This is the Main Menu, this menu is the place in the program where the Interface is divided into three parts, concepts on the far right, results in the center, and custom simulations on the far left. To progress further within the program press any of the three buttons.

## Concepts Menu



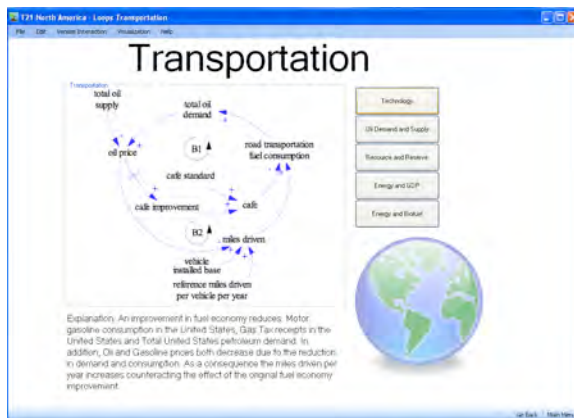
This is the menu, which allows the user to understand how the model works. The user can decide to view a simple model overview on the top, or to view causal loop diagrams in the middle, or if they are an experienced modeler or user of T21, they can choose to view T21- North America in more detail from the button on the bottom.

## Model Concept Screen



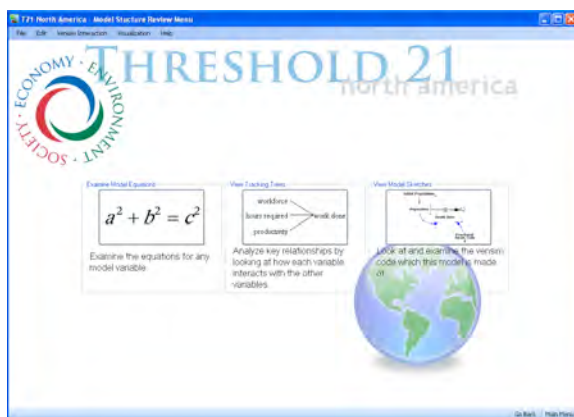
This screen shows a simplified conceptualization of the T21-North America model. The user has the ability to look at the major sectors of the model and how they are interrelated by causal feedback loops. The user has the ability to expand the society economy and environment spheres.

## Causal Loop Diagram Screens



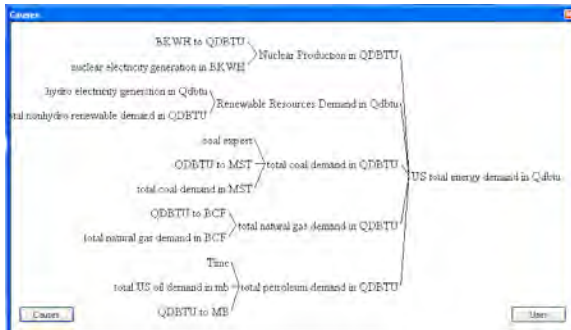
These screens show in more detail some of the most important feedback loops existent in the model. The user has the ability to view 6 of these and explanations on how they function. Some of these causal loop diagrams have been made into visualizations on which simulations are run.

## Advanced Model Structure Menu



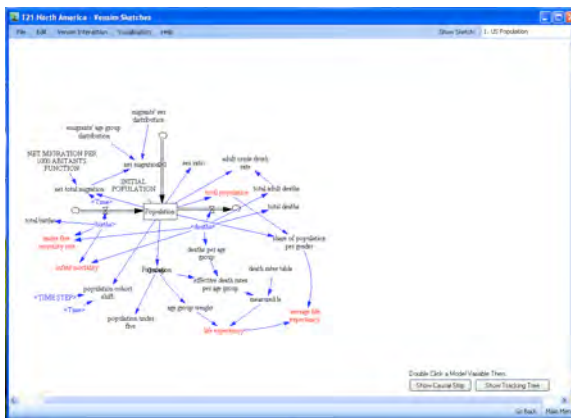
This menu allows the advanced user of T21-North America to explore model equations by pressing the button on the far left, causal tracking trees which also double as uses trees by pressing the button in the center, and it even allows for the examination of the T21-North America source code by pressing the button on the far right.

## Causal Tracking Trees



This screen allows user to trace feedback loops in T21-North America, by selecting a variable from a provided list, then following its origins or uses through the entire model. This screen is helpful incase of confusion over how some feedback loops are structured.

## Vensim Sketches



This screen allows the advanced user to see the source code of T21-North America. The model is written in a visual modeling language called Vensim, and these are the sketches used by Vensim to represent models. Here the user can view a Tracking Tree, or a Causal Strip for any model variable by double clicking on the variable in the sketch and pressing the correct button.

## Analyze Results Menu



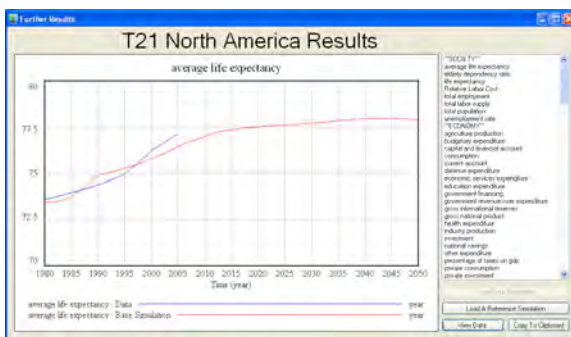
This menu allows the user to view the results of the T21- North America model. The button on the far left allows the user to view premade graphs, the button in the center allows the user to view a visualization of the base case and historical data, while the button on the far right allows the user to fully explore the model results in graphical and table form.

## Visualization Screen



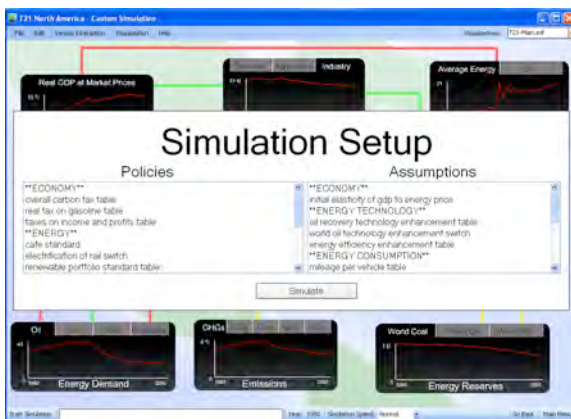
This is a visualization of the model structure, displayed using data directly from T21-North America. The lines represent the flows of influence between the graphs that it connects. The visualization can be changed by selecting any of the items in the drop down menu in the upper right of the screen. Custom visualizations can also be made by the user. To learn more read Chapter 2 of the full manual.

## Results Screen



This panel pops up after a visualization has been run, or after being selected from the Analyze Results menu. It allows the user to view the results of the last simulation and to add reference scenarios to compare against. The user can select any of the variables listed, which gives them access to both the graph, and the data, which can be exported.

## Custom Simulation Screen



This screen allows users to run custom simulations using the T21-North America model. The user is presented with an array of policy decisions to make, as well as multiple model assumptions to modify. To learn more about each policy and assumption read Chapter 1 of the full T21-North America manual.