

## Cost Analysis of the Hydrogen Economy Using FLOW

As the need for alternative fuel and energy sources increases, efforts to analyze the cost and viability of these sources also increase. One of the cost analysis models the Department of Energy (DOE) is currently using is known as H<sub>2</sub> analysis, or H2A. H2A estimates the cost of production, delivery, and storage of hydrogen, giving a cost in \$/kg of hydrogen. The H2A model looks at several different scenarios, such as transporting hydrogen as a compressed gas through a pipeline, as a compressed gas by truck, or as a liquid by truck. Currently, these models are all calculated in Excel on different spreadsheets. Using, reverse engineering, a step by step process was developed by which each step of the H2A model could be programmed into a simulation software package known as FLOW, named for its ability to create flow sheets and created at Oak Ridge National Laboratory. Python, a process modeling scripting language, was the computer language used due to the fact that it is already embedded in FLOW. After a module was made, it was then checked to make sure it corresponded to the values found in the H2A calculations. Then the module could be used in a flow sheet to compare similar types of operations, such as the transportation methods mentioned above. This allows the user to more easily compare different methods used in the H2A analysis in several ways. First, FLOW is a graphical program and does not show intermediate calculations as in the spreadsheets used in H2A. Second, several methods of transportation, storage, or other components of the hydrogen economy can be compared on the same flow sheet. Finally, user inputs are easily manipulated as in Excel. This project is a small but important part in the DOE's analysis of the hydrogen economy. It allows quick, yet accurate use of H2A analysis spreadsheets in an easy to use graphical format, allowing this small section of the hydrogen economy to be modeled more effectively.

Student's Name:	<b>Shannon Wroblewski</b>
School Student Attends:	Tennessee Technological University
Name(s) of Mentor(s):	<b>Juan J. Ferrada</b>
Division:	Nuclear Science and Technology Division
Program:	DOE Science Undergraduate Laboratory Internships