IMPLAN®

To calculate the economic impact of PNNL on the state of Washington, PNNL used IMPLAN® (IMpact analysis for PLANning),[1] a widely accepted economic input-output model, to estimate funding, employment, and labor income impacts. IMPLAN®, a product of IMPLAN® Group LLC, Inc., contains highly disaggregated data on regional economic indicators based on data from a variety of sources, such as the U.S. Bureau of Economic Analysis, and then aggregates the entire economy into 526 sectors. It is based on social accounting between industries and within the distribution chain and contains numerous economic multipliers to quantify direct, indirect, and induced output; employment; and labor income impacts. Output from IMPLAN® is in the form of direct, indirect, and induced economic output (gross funding); jobs; and labor income created or supported, as well as their associated multipliers.

Each sector that produces goods and services generates demand for goods and services in other sectors. This iterative process is the multiplier effect. Multipliers can be described through the following definitions:

- Direct effects are the initial change to the industry or institution in question.

- Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly affected industries. The direct change creates increases in economic activity for downstream businesses that support these direct industries.

- Induced effects are the increases in household income expenditures generated by the direct and indirect effects.

The Washington State data file for 2016 was used in this analysis, with gross domestic product deflators within the model used to convert impacts to 2020 dollars. PNNL data on purchases of goods and services, associated companies output, employee payroll, retiree income, visitor spending, and healthcare purchases were compiled and translated into IMPLAN® inputs. Table A.1 characterizes the IMPLAN® inputs.

1. IMPLAN®. Version 3.0. Davidson, NC: IMPLAN® Group LLC, Inc. www.implan.com.

Table A.1. | **IMPLAN® Input Characterization**

Expenditures	Input Characterization
Purchases on Goods and Services	Expenditures were assigned a NAICS code and then translated to their respective IMPLAN® sector using the IMPLAN® NAICS bridge. Expenditures were calculated as an industry change and retail margins used where needed. Purchases are dominated by the construction, real estate, engineering services, medical and diagnostic laboratories, computer systems design services, and university sectors.
Companies with PNNL Roots	Each company was assigned an IMPLAN® sector. IMPLAN® data were used to derive an output per employee and each company's output was subsequently calculated in IMPLAN®. The dominant sector was battery storage manufacturing.
Employee Salaries	Payroll data are calculated in IMPLAN® as a change in employee compensation. IMPLAN® derives the impact from the model's income expenditure patterns.
Healthcare Spending	Healthcare expenditures from employees and retirees were assigned a NAICS code and translated to one of the five primary medical IMPLAN® sectors and one retail sector supplying medical-related items and then calculated as an industry change. Margins were used for the retail sector.
Retiree Income	Retiree income was calculated in IMPLAN® as a change in employee compensation. IMPLAN® derives the impact from the model's income expenditure patterns.
Visitor Spending	Visitor spending was aggregated into day-visitor and overnight-visitor spending and calculated in IMPLAN® as a change in sectors typically affected by visitor spending, such as accommodation, food establishments, and retail gasoline sectors.

IMPLAN® = IMpact Analysis for PLANning
NAICS = North American Industry Classification System