

Ex. 405

**National Renewable Energy Laboratory
Jobs and Economic Development Impact (JEDI) Models**

Limitations of JEDI Models

Results are an estimate, not a precise forecast.

The Jobs and Economic Development Impact (JEDI) models are input-output based models, also appropriately called calculators or screening tools. As such, they share important limitations with all models based on input-output calculation methodologies. For the interested user, the Environmental Protection Agency recently published [EPA Assessing the Multiple Benefits of Clean Energy: A Resource for States¹](#), which discusses and compares different types of models and screening tools for assessing economic impacts and jobs, including JEDI (see Chapter 5, pp. 136-142). The most important limitation to note is that JEDI results are estimates, not precise forecasts, for the following reasons.

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Results reflect gross impacts and not net impacts.

In common with most input-output screening tools, the JEDI model reports only the gross impacts from the project described.² The JEDI results do not reflect many other economic impacts that could affect real-world impacts on jobs from the project. These other economic impacts include, but are not limited to:

- Potential increases or decreases in electricity rates or fuel prices resulting from investments in new electricity or fuel infrastructure
- Local economic development losses associated with the possible displacement of other local energy sources
- The displacement of some other type of economic activity due to investment in this particular project

Results are based on approximations of industrial input-output relationships.

Input-output models, including JEDI, apply historical relationships between demand (i.e., specific expenditures within a given industrial sector) and the resulting economic activity to estimate how new expenditures will affect economic development metrics including jobs, earnings (wages and employer paid impacts), and output, a general measure of economic activity.³ The accuracy of these inter-industry relationships (i.e., input-output coefficients or multipliers) is dependent on parameters including the date of the multipliers reflecting the relationships, how well the defined industrial sectors reflect the particular inputs and outputs of the technology project being studied, and how well the multipliers reflect the geography of where the technology project is located.

Date of multipliers: The JEDI model multipliers are derived from Minnesota IMPLAN Group's [IMPLAN](#) accounting software. For JEDI, these are updated every two years for the best available information. The best available information is ultimately based on national input-output tables developed by the Department of Commerce Bureau of Economic Analysis (BEA) in 2002. However, the inter-industry relationships utilized in input-output modeling tend to change gradually over a long period of time; input-output modeling remains a widely used methodology for measuring economic development activity.

Definition of industrial sectors: The basic 2002 input-output coefficients are provided by the BEA for more than 400 industrial sectors as defined by the [North American Industry Classification System](#). However, these definitions pre-date the development of many renewable energy technologies. Therefore, correlating these fixed categories to the industrial impacts of renewable energy technologies requires assumptions. JEDI generally aggregates these 400+ detailed sectors into fourteen higher level sectors that are appropriate for most JEDI model technologies.

Geographic specificity: Sets of input-output multipliers vary depending on the definition of the geographic area under consideration. Datasets of multipliers from IMPLAN are available at the county, state, regional, and national levels. JEDI models provide state-specific multipliers. However, the [User Add-in Location](#) feature allows users to complete an analysis for a specific region of interest other than the state level. Necessary inputs include multipliers for the output categories: employment, earnings, and output (per million dollars change in final demand) as well as personal consumption expenditures (e.g., average consumer expenditures on goods and services — calculated as a percentage for each industry — totaling 100 percent combined), for fourteen aggregated industries. Users have the option to purchase county- or regional-level datasets from IMPLAN.

Results are based on the assumption that all industrial inputs and factors of production are used in fixed proportions and respond perfectly elastically.

This means that the impacts will typically be linear — that is, directly proportional to the size of the project without respect to economies of scale. Also, this means that prices do not change with demand. Such assumptions may be reasonable where the additional source of demand is a small proportion of the local economy, or the economy is relatively open and integrated with outside economies. However, this assumption does contribute to the lack of precision, and the need for caution in interpreting results.⁴

Results are dependent on the accuracy and appropriateness of the project description.

NREL analysts perform interviews with project owners, developers, engineering and design firms, construction firms, and others to align initial default model information as closely as possible with reality. This includes costs and expenditures, financing details, taxes, lease payments, and local share of spending for each model. This default data reflects industry averages and nationwide information, and is typically not provided for specific states. This default information is not updated on a regular basis and varies by model. Users are encouraged to incorporate location and project-specific data to derive more localized and meaningful results.

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Results are not a measure of project profitability or viability.

JEDI results are an estimate of economic impacts in terms of possible jobs, earnings, and output that might occur as a result of the proposed project. However, all results should be interpreted in light of the limitations described above. JEDI results presuppose that projects are financially viable and can be justified independent of their economic development value. The JEDI model does not provide any type of cost/benefit analysis, return on investment, or other measure of project profitability or viability.

Results do not include intangible effects.

JEDI models do not calculate or report any type of intangible effects from new projects. These include, but are not limited to, improvements in transmission or grid reliability, changes in air or water emissions, changes in water use from power generation, changes in land use, and stability of electricity prices that might result from the reduced fuel price risk of renewable sources of electricity.

Footnotes

¹ *Assessing the Multiple Benefits of Clean Energy: A Resource For States.* U.S. Environmental Protection Agency, February 2010.

² Some input-output models do include features that account for magnitude of demand and economies of scale. Some also include a full suite of dynamic features which account for pricing variability and labor cost variability among other factors.

³ Output is defined more broadly than other metrics of economic activity including value added or GDP; output is the sum value of all goods and services at all stages of production (i.e., as a raw material and as a finished product). Value added refers only to the market value of the final product.

⁴ Brown, J.P.; Pender, J.; Wiser, R.; Lantz, E.; Hoen, B. "Ex-Post analysis of Economic Impacts from Wind Power Development in U.S. Counties." Submitted to *Energy Economics*, January 2012.

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