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Subject: Economic Impact Analysis of Vistra's Solar Projects

The purpose of this memo is to highlight the findings of our economic impact analysis that analyzes eight utility-scale solar powered-electric generation facilities that will utilize photovoltaic (PV) panels installed on a single-axis tracking system.

**Pulaski Solar 400 MW Project**

The table shows the economic impact results for Pulaski County and the State of Illinois for an ~400 MW Pulaski Solar Project.

**Regional Impact**

As shown, the new local jobs created or retained during construction total 752, and the new long-term jobs created total 47.6 for Pulaski County. The new local earnings during construction total over $53 million, and the new local earnings during operations totals over $2.2 million. Finally, the new local output during construction totals over $74.2 million, and the new local output during operations totals over $3.4 million for Pulaski County.

**Statewide Impact**

For the State of Illinois, the new local jobs created or retained during construction total 1,331, and the new long-term jobs created total 68.7.

The new local earnings during construction total over $117 million, and the new local earnings during operations totals over $5.7 million.

Finally, the new local output during construction totals over $185 million, and the new local output during operations totals over $9.9 million for the state of Illinois.

**Total Economic Impacts for Pulaski Solar**

| | Pulaski County | | | State of Illinois | | |
|---|---|---|---|---|---|---|
| | Jobs | Earnings | Output | Jobs | Earnings | Output |
| **Construction** | | | | | | |
| Direct | 549 | $45,369,963 | $49,667,810 | 766 | $80,406,212 | $85,284,813 |
| Indirect | 164 | $6,335,829 | $19,508,928 | 315 | $21,234,295 | $54,929,182 |
| Induced | 39 | $1,362,328 | $5,084,903 | 250 | $16,233,610 | $44,811,095 |
| *Total* | *752* | *$53,068,120* | *$74,261,641* | *1,331* | *$117,874,118* | *$185,025,090* |
| | | | | | | |
| **Operations (Annual/Ongoing)** | | | | | | |
| Direct | 36.6 | $1,810,796 | $1,810,763 | 36.6 | $3,614,885 | $3,614,885 |
| Indirect | 5.6 | $258,510 | $926,879 | 11.5 | $842,471 | $2,634,960 |
| Induced | 5.3 | $187,214 | $699,049 | 20.5 | $1,334,515 | $3,684,067 |
| *Total* | *47.6* | *$2,256,520* | *$3,436,692* | *68.7* | *$5,791,871* | *$9,933,912* |

# Economic Impact Methodology

The economic analysis of the solar and energy storage development presented here uses the National Renewable Energy Laboratory's (NREL) latest Jobs and Economic Development Impacts (JEDI) Solar PV Energy Model.[1] The JEDI Model is an input-output model that measures the spending patterns and location-specific economic structures that reflect expenditures supporting varying levels of employment, income, and output. The JEDI Model takes into account that the output of one industry can be used as an input for another. The JEDI Model reveals how purchases of project materials not only benefit local manufacturers, but also the local industries that supply the concrete, rebar, and other materials (Reategui et al., 2009). The model utilizes construction cost data, operating cost data, and data relating to the percentage of goods and services acquired in the state to calculate the associated jobs, earnings, and economic activity. The results from the model are broken down into the construction period and the operation period of the project. Within each period, impacts are further divided into direct, supply chain (indirect), and induced impacts.

Originally, the JEDI model was developed by Marshall Goldberg of MRG & Associates, under contract with NREL in 2002, to demonstrate the economic benefits associated with developing wind farms in the U.S. The model utilizes state-specific industry multipliers obtained from IMPLAN (Impact Analysis for PLANning). IMPLAN software and data are managed and updated by the Minnesota IMPLAN Group, Inc., using data collected at federal, state, and local levels. The solar JEDI model considers 22 aggregated industries: agriculture, mining, construction, construction/installations – non-residential, construction/installation-residential, manufacturing, fabricated metals, machinery, electrical equipment, battery manufacturing, energy wire manufacturing, wholesale trade, retail trade, transportation-communications and public utilities (TCPU), insurance and real estate, finance, other professional services, office services, architectural and engineering services, other services, government and semiconductor. This study does not analyze net jobs, instead it focuses on the gross jobs that the new solar and energy storage developments support.

The economic analysis of the continuing operations of the coal plants was modeled directly within IMPLAN. Since the JEDI model is built on the IMPLAN framework, the two analyses are fully compatible. IMPLAN has been a standard tool for academic and professional economists for decades. The methods used to produce IMPLAN's economic data set and economic impact estimates have been widely published both in professional publications as well as peer-reviewed academic journals. Many of these methods are considered standard best practices in a wide variety of applied economic fields today.

The total economic impact can be broken down into three distinct types: direct impacts, indirect impacts, and induced impacts.

**Direct impacts** during the construction period refer to the changes that occur in the onsite construction industries in which the direct final demand (i.e., spending on construction labor and services) change is made. Onsite construction-related services include installation labor, engineering, design, and other

[1] The solar analysis uses PV12.23.16 but also replaces the IMPLAN multipliers with the latest 2020 multipliers from IMPLAN. The JEDI model has been used throughout the renewable energy economic development literature (see Tegen, Keyser, Flores-Espino, Zammit, and Loomis, 2016; Tegen, Keyser, Flores-Espino, and Hauser, 2014; Zammit and Miles, 2013).

professional services. Direct impacts during operating years refer to the final demand changes that occur in the onsite spending for the solar operations and maintenance workers.

The initial spending on the construction and operation of the PV installation will create a second layer of impacts, referred to as "supply chain impacts" or "indirect impacts."

**Indirect impacts** during the construction period consist of changes in inter-industry purchases resulting from the direct final demand changes and include construction spending on materials and PV equipment, as well as other purchases of goods and offsite services. Utility-scale solar PV indirect impacts include PV modules, invertors, tracking systems, cabling, and foundations.

**Induced impacts** during construction refer to the changes that occur in household spending as household income increases or decreases as a result of the direct and indirect effects of final demand changes. Local spending by employees working directly or indirectly on the project who receive their paychecks and then spend money in the community is included. The model includes additional local jobs and economic activity that are supported by the purchases of these goods and services.

# Economic Impact Results

**Statewide Economic Impact**
The economic impact results were derived from detailed project cost estimates supplied by Vistra and described above. The state JEDI model used the 2020 IMPLAN multipliers for the State of Illinois.

The modeling assumes that 30% of the labor installation is supplied from within the county where each project is located and 50% is supplied from within the state. Further, 0% of the materials and equipment needed for construction were assumed to be sourced from within the county or state. Other costs such as development costs and contingency/overhead were assumed to be spent 25% within the county and 50% within the state. All permitting costs were assumed to be spent 100% within the county and state. The annual operations and maintenance cost for the solar projects were derived from the JEDI model default values. Labor technician costs are estimated to be $7.09/kW and materials and services were estimated to be $4.73/kW at the start of the projects' operations.
The analysis shows the results from these models during both the construction and operations period.

The results from the JEDI model show significant employment impacts from the solar projects. Employment impacts can be broken down into several different components. Direct jobs created during the construction phase typically last anywhere from 12 to 18 months depending on the size of the project; however, the direct job numbers present in Table 2 from the JEDI model are based on a full time equivalent (FTE) basis for a year. In other words, 1 job = 1 FTE = 2,080 hours worked in a year.

*A part time or temporary job would constitute only a fraction of a job according to the JEDI model. For example, the JEDI model results show 2,280 new direct jobs during construction in the State of Illinois, though the construction of the solar generation facilities could involve closer to 4,560 workers working half of a year. Due to the short-term nature of construction projects, the JEDI model often significantly understates the number of people actually hired to work on the project. It is important to keep this fact in mind when looking at the numbers or when reporting the numbers.*

Direct construction jobs and operations and maintenance jobs both require highly-skilled workers in the fields of construction, management, and engineering. These well-paid professionals boost economic development in rural communities where new employment opportunities are often limited.

Accordingly, it is important to not just look at the number of jobs but also the earnings that they produce.

Output refers to economic activity or the value of production in the state or local economy. It is an equivalent measure to the Gross Domestic Product, which measures output on a national basis.

**County-Level Economic Impacts**

Separate JEDI models were produced to show the economic impact of each project at the county level. Each JEDI model used the 2020 county multipliers from IMPLAN for that specific county.