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Economic Analysis of Proposed Capital Dynamics Solar Farm in Knox County, Indiana

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Executive Summary

Capital Dynamics plans to invest nearly $128 million to construct a 1,200-acre solar electricity generation facility in Knox County, Indiana. The construction phase of this project is estimated to take 10 to 12 months to complete and require an estimated 390,000 person-hours of labor.

Most of the impact of the project in Knox County will be generated by the hiring of construction workers and their subsequent spending of earnings in the area. The estimated labor budget for the construction phase translates into an estimated 188 full time equivalent (FTE) workers over the course of a year earning roughly $13.3 million in total compensation during the construction period, which represents direct effects provided by the project within the county. The workers will have a further economic impact in Knox County by spending money locally (on housing, healthcare, groceries, entertainment, etc.), resulting in impact multipliers or "ripple effects."[1] The ripple effects of this construction project will generate an additional 65 jobs at other businesses in Knox County, bringing the total employment footprint of the construction phase to 253 FTE jobs worth $15.9 million in compensation, as well as $20.9 million contributed to the county's gross domestic product (GDP).[2]

The annual operation and maintenance of the facility will involve four employees who will earn total compensation of approximately $330,000. Additionally, Capital Dynamics will spend approximately $363,000 annually to procure the necessary goods and services to operate the facility. The annual ripple effects generated by these supply chain purchases and by the household spending of the onsite employees will support an additional six jobs in Knox County. All told, the full ongoing annual economic impact of the operations of the facility in Knox County are approximately 10 FTE jobs and $559,000 in employee compensation, as well as a $941,000 contribution to the county's GDP.

[1] Defined as the economic activity generated by workers when they purchase needed goods and services from other Knox County businesses, as well as the impacts of household spending in the county by the workers.

[2] In terms of multipliers, every job directly tied to the construction phase of this project supports another 0.35 jobs in the county, while every dollar of payroll generates an additional $0.20 in compensation with other local employers. Every dollar of GDP generated triggers an additional $0.28 in economic activity.

1 Introduction

Capital Dynamics, the second-largest owner of solar facilities in the United States, has proposed to develop a 180 megawatt DC/150 megawatt AC solar farm in Knox County, Indiana. This document summarizes an input-output economic modeling analysis to estimate the economic effects of this development on employment, labor income, and gross state product in Knox County.

Section 2 of this report provides background information, characterizing Indiana's baseline energy and electricity sector and Knox County's existing economic conditions. Section 3 describes the data and methods used to model the impacts of the planned solar development, and Section 4 presents and explains the results. Section 5 provides references, and the appendices provide supplemental information, including additional discussion of the modeling approach used for the analysis and a description of the authors of this report.

2 Background

This section provides background information about Indiana's energy and electricity sector (Section 2.1) and the recent economic conditions of Knox County where the development will be located (Section 2.2).

2.1 Indiana Energy and Electricity Sector

Indiana consumes more energy than it produces, making the state a net importer of energy. According to the United States Energy Information Administration (U.S. EIA, 2017), the total energy production for the state of Indiana in 2017 was 979 trillion BTUs, comprising 1.1 percent of energy production for the U.S. Total Indiana energy consumption for the same year was 2,708 trillion BTUs. Thus, Indiana's net energy import was 1,729 trillion BTUs.

Primary energy production in Indiana is dominated by coal. In 2017, statewide coal production was 713.4 trillion BTUs, which accounted for 72.8 percent of all estimated energy produced in Indiana that year (Table 1; U.S. EIA, 2017). Indiana is the nation's eighth largest coal producer and second largest coal consumer (by volume) after Texas (U.S. EIA, 2019a). In terms of Indiana's total energy production, coal is followed by biofuels (16.3 percent) and other renewable energy (9.2 percent) (U.S. EIA, 2017).

Table 1: Total Energy Production in Indiana, 2017

Resource Type	Energy Production Estimates (trillion BTU)	Percent of Total Energy Production
Coal	713.4	72.8%
Biofuels	159.8	16.3%
Other Renewable Energy	89.8	9.2%
Crude Oil	10.2	1.0%
Natural Gas	6.2	0.6%
Total Production	979.4	100%
Source: United States Energy Information Administration (2017)		

Energy consumption refers to energy used as a direct fuel source for industry, heating, transportation, and electricity. The energy consumed in Indiana mainly comes from fossil fuels, with coal and natural gas accounting for over 60 percent (Table 2). Renewables represent only a small fraction of Indiana's energy consumption, with renewables other than hydroelectric power and biomass accounting for 2 percent of all energy consumed in 2017, or 54.6 trillion BTUs.

Table 2: Total Indiana Energy Consumption, 2017

Resource Type	Energy Consumption Estimates, Trillion BTU	Percent of Total Energy Consumption in IN
Coal	929.3	34.3%
Natural Gas	747.9	27.6%
Motor Gasoline excl. Ethanol	355.6	13.1%
Distillate Fuel Oil	214.6	7.9%
Biomass	125.0	4.6%
Net Interstate Flow of Electricity[a]	111.2	4.1%
Other Petroleum	90.3	3.3%
Jet Fuel	55.1	2.0%
Other Renewables	54.6	2.0%
HGL	17.8	0.7%
Residual Fuel	3.6	0.1%
Hydroelectric Power	2.8	0.1%
Total Consumption	2,707.8	100%

Source: United States Energy Information Administration (2017)
a. Defined by the U.S. EIA as follows: "The difference between the sum of electricity sales and losses within a state and total amount of electricity generated within that state. A positive number indicates that more electricity (including associated losses) came into the state than went out of the state during the year; conversely, a negative number indicates that more electricity (including associated losses) went out of the state than came into the state."

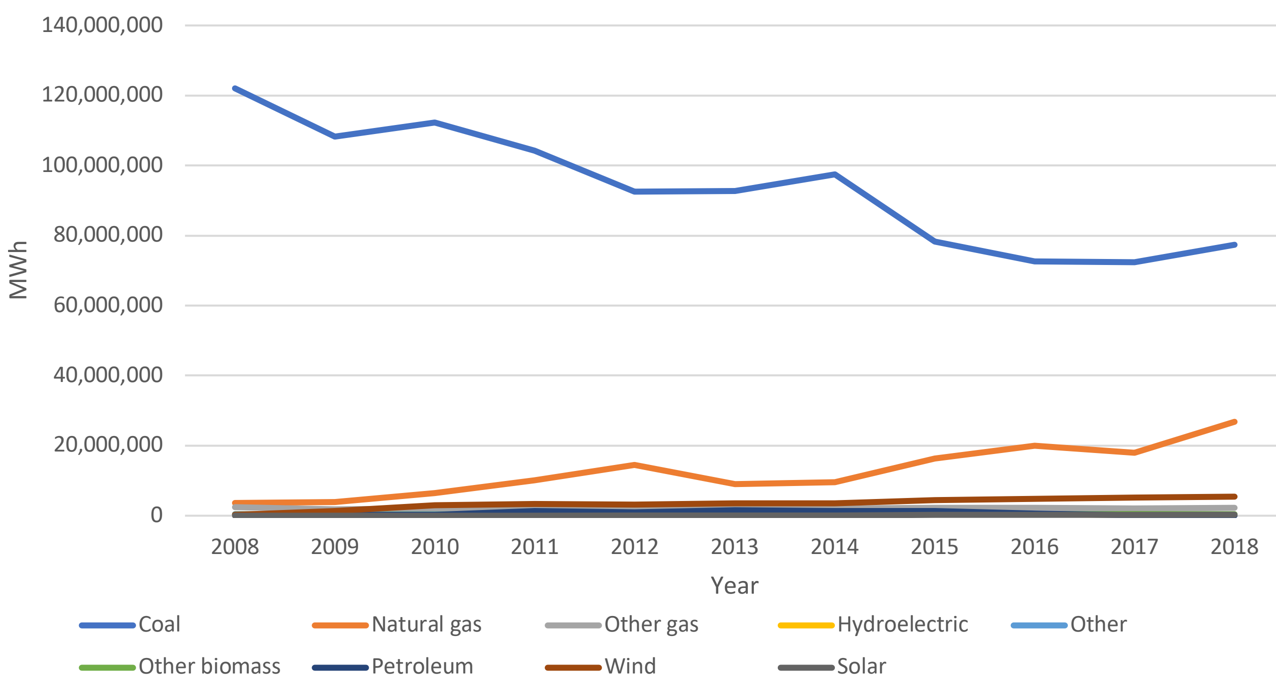
Generation refers to the amount of electricity generated within the state of Indiana. Electricity in Indiana is generated by a variety of sources, with the largest shares attributable to coal (almost 70 percent) and natural gas (almost 24 percent) (Table 3; U.S. EIA 2019b). In addition to electricity generated within the state (Table 3), Indiana imports approximately 10 percent of the electricity it consumes (U.S. EIA 2019a). Wind is the most developed renewable energy resource in Indiana, representing approximately 5 percent of electricity generated, followed by solar and hydropower, which each account for less than 1 percent.

Table 3. Electricity Generation in Indiana, 2018

Resource Type	MWh Generated Within Indiana	Percent of Total Energy Generation in IN
Coal	77,455,229	68.3%
Natural gas	26,816,995	23.6%
Wind	5,437,153	4.8%
Other gas	2,325,813	2.0%
Other biomass	459,889	0.4%
Other	320,666	0.3%
Solar	290,717	0.3%
Hydroelectric	222,661	0.2%
Petroleum	130,617	0.1%
Total Electricity Generation	113,459,740	100%

Source: United States Energy Information Administration (2019b)

In recent years, the share of Indiana's electricity generated from coal has decreased, as shown in Figure 1. Between 2008 to 2018, 28 of the 56 coal-fired generation units in Indiana have retired because they are no longer competitive, and, based on the Indiana Utilities Commissions (IURC) integrated resource planning, it is anticipated that 14 more coal-fired generation units will retire by 2028 (IURC, 2019). As a result of the decline in coal together with the relatively low cost of natural gas, natural gas usage for electricity generation within the state has increased five-fold in the last decade, from 35,576 to 225,699 million cubic feet (U.S. EIA, 2019b).



Source: United States Energy Information Administration (2019b)

Figure 1: Electric Power Generation in Indiana, 2008-2018

Although renewables represent only a small fraction of Indiana's energy portfolio, their development within the state of Indiana is increasing every year (Figure 1). Solar power generating capacity increased from zero in 2011 to 216 MW by 2018, while wind capacity increased from 1,340 MW to 2,310 MW over the same period (U.S. EIA, 2019b). Net metering[3] and increasing ability to use batteries to store energy are likely to be significant factors in the continued expansion of renewables. Additionally, advances in renewable technology together with state and regional trends encouraging renewables (such as feed-in tariffs and public benefit funds, among others), are expected to continue making renewables more

[3] Net metering is a service by which customers can self-supply a portion of their electricity usage by installing renewable energy facilities. This is becoming increasingly popular in Indiana; at the end of 2016, participation in net metering exceeded 1,100 customers statewide, with nearly 20 MW of total capacity. By the end of 2018, 2,500 customers had installed net metering with 76 MW of total capacity (IURC, 2019).

widespread and competitive. In May 2011, Indiana created a voluntary clean energy portfolio standard for utilities, known as the Comprehensive Hoosier Option to Incentivize Cleaner Energy (CHOICE) program. The program sets a voluntary goal of 10 percent clean energy by 2025, based on the amount of electricity supplied by the utility in 2010.

Indiana has historically seen lower electrity prices than the rest of the United States, with an overall favorability (i.e. affordability) rating of 4th nationally in 2003. However, the state remains reliant on coal and as such electricity prices are tethered to coal markets. Since 2003, coal prices have tended to increase, while natural gas and renewables prices have tended to decrease. As a result, Indiana's electricity prices have increased compared to the rest of the United States, with a favorability rating of 23rd in 2018. Investment costs to address environmental mandates and the replacement of aging infrastructure have also contributed to the reduced relative price advantage (IURC, 2019). Furthermore, as coal-fired energy generation within the state has decreased, Indiana's total generation has decreased, requiring more electricity to be imported to meet statewide demand (U.S. EIA, 2019a).

Indiana's State Utility Forecasting Group (SUFG), established by statute to provide an independent forecast of Indiana's electricity needs, projects in their 2019 Indiana Energy Forecast that electricity usage will grow at a rate of 0.67 percent per year over the next 20 years (SUFG, 2019). They also predict that Indiana electricity prices will increase through the year 2026, due to increases in fuel costs and the installation of new emissions control equipment, and then prices will steadily decrease. When prices for coal, natural gas, and oil increase, electricity demand faces multiple pressures. To the extent that these fuels generate electricity, when their price increases, electricity prices rise and electricity demand falls, all else being equal. On the other hand, because fossil fuels compete directly with electricity to provide end use services such as heating, when the price of fossil fuels rises electricity becomes relatively more attractive and electricity demand tends to rise, all else being equal. The net impact of these opposing forces depends on how they affect utility costs, the responsiveness of customer demand to electricity price changes, and the availability and competitiveness of fossil fuels in the end-use services markets. Importantly, in the long term, the projected additional resource requirements are higher than in previous forecasts, which indicates a need for a "mix of natural gas-fired combustion turbines and combined cycle units, with wind and solar capacity." This is largely due to the announcement of the retirement of generators by Indiana utilities since the publishing of previous reports (SUFG, 2019).

2.2 Knox County Economy

Knox County, in southwest Indiana, has a total population of 36,594 as of 2019, ranking 42nd out of Indiana's 92 counties and accounting for 0.5 percent of the state's population (STATS Indiana, 2020). Recent data[4] indicate that economic characteristics for the county's population are mixed compared to statewide statistics, with median household income of $48,606 (lower than the statewide $55,725), unemployment rate of 3.1 percent (slightly lower than the state rate of 3.3 percent), and a poverty rate of 15.7 percent (higher than the statewide rate of 13.0 percent).

Table 4 summarizes key economic indicators for the county broken out by industry.

[4] Compiled and summarized by STATS Indiana (2020).

Table 4: Summary of Knox County Economic Data by Industry, 2018

Sector	Employment	Labor Income (millions)	Gross Domestic Product (millions)
Administrative Government	4,845	$240.7	$297.5
Health Care and Social Assistance	2,396	$134.7	$223.8
Manufacturing	2,303	$125.3	$1,663.0
Retail Trade	2,064	$55.5	$163.0
Accommodation and Food Services	1,824	$36.5	$114.1
Other Services (except Public Administration)	1,764	$49.6	$117.8
Construction	1,120	$60.9	$156.2
Agriculture, Forestry, Fishing and Hunting	939	$61.1	$223.3
Mining, Quarrying, and Oil and Gas Extraction	875	$84.9	$342.4
Administrative and Support and Waste Management and Remediation Services	870	$25.5	$60.2
Real Estate and Rental and Leasing	655	$14.5	$233.5
Wholesale Trade	651	$39.9	$177.0
Transportation and Warehousing	647	$44.9	$106.8
Professional, Scientific, and Technical Services	618	$33.1	$98.1
Finance and Insurance	520	$22.8	$113.4
Arts, Entertainment, and Recreation	503	$1.4	$10.6
Utilities	294	$44.6	$377.1
Government Enterprises	208	$17.7	$61.9
Information	142	$7.1	$73.6
Educational Services	120	$3.8	$5.4
Management of Companies and Enterprises	109	$5.1	$12.7
Total	23,465	$1,109.2	$4,631.3
Source: IMPLAN			

3 Data, Assumptions, and Methods

Table 5 shows construction phase assumptions used in the economic modeling, while Table 6 shows assumptions for the subsequent operations phase.

The planned Knox County development (Ratts 2) will be a 180 megawatt DC/150 megawatt AC solar installation on approximately 1,200 acres, representing an 83 percent increase over the state's 2018 solar generation capacity (see Section 2.1). For the purposes of the economic modeling, we assume that the construction phase will take approximately 10 to 12 months and a total of 390,000 hours of labor, equating to 188 person-years or 48,750 person-days in construction labor on a full-time basis.[5] The operations phase will entail the employment of 4 full-time workers.

Table 5: Construction Phase Assumptions in Modeling of Knox County Development

Assumption	Value
Number of person hours	390,000
Duration of project	10-12 months
Total project investment amount	$127,900,000
Amount for labor	$13,330,000
Amount for equipment and materials	$113,330,000
Amount for engineering and other professional services	$1,200,000
Percent of labor provided by out-of-state contractors	30%
Percent of equipment and materials provided by out-of-state vendors	90%
Percent of engineering and professional services provided by out-of-state vendors	85%

Table 6: Operations Phase Assumptions in Modeling of Knox County Development

Assumption	Value
Generation capacity (megawatts DC/megawatts AC)	180/150
Number of employees	4
Total annual payroll (wages and benefits)	$330,000
Annual spending on goods and services[a]	$363,000
Spare parts (cost per kwdc annually)	$0.15
Vegetation management (cost per acre annually)	$100
Size (acres)	1,200
Misc (cost per kwdc annually)	$0.20
Asset management services (total annual cost)	$180,000
a. Calculated as (spare parts cost x generation capacity x 1,000) + (vegetation management cost x size) + (misc. cost x generation capacity x 1,000) + asset management services costs	

[5] Assuming 2,080 hours for one person-year and 8 hours for one person-day.

As with any production or construction activity, some portion of the goods and services needed to complete the Ratts 2 project will be purchased outside of the local economy from manufacturers and service providers that are located elsewhere. In fact, given that solar facilities consist almost entirely of highly specialized equipment and material, Capital Dynamics estimates that between 80 percent and 90 percent of the supply chain inputs needed for the installation phase of this project will be provided by vendors from outside the local area. Within the economic impact analysis, this non-local spending is considered leakage and does not factor into the economic impacts of Capital Dynamics' investments discussed in this report.

The employment and spending assumptions shown in Table 5 and Table 6 represent direct effects of the development. The economic effects of this project do not end there, however. A Knox County resident working on the construction of the facility, for instance, will spend much of their earnings in the local area on housing, health care, groceries, entertainment, etc. Even construction workers who do not reside in the area will have an economic effect in Knox County by spending money on lodging, meals, gasoline, and other incidentals while on the job. Additionally, construction contractors create additional secondary effects when they purchase needed goods and services from other Knox County businesses.

To estimate these so-called economic "ripple effects," analysts used the IMPLAN economic modeling software to conduct an input-output analysis for both the initial construction phase of this project as well as the ongoing operation and maintenance phase.[6] Specifically, we assume that workers who reside in Knox County have typical local spending habits broken out by sector. For workers from outside the county, we assume that their in-county spending is more akin to visitor spending, with assumed expenditures summarized in Table 7.

The ripple effect estimates derived from this analysis combine with the direct effects to describe the full economic contributions of Capital Dynamic's investments.

Table 7: Assumptions Regarding Local Expenditures by Non-Resident Workers

Category	Daily Expenditure (2020 $)
Lodging	$50.00
Restaurants	$23.55
Food Stores	$23.55
General Merchandise Stores	$3.95
Gas Stations	$3.95
Source: Based on U.S. General Service Administration's per-diem rates for Indiana for meals and incidentals, except for lodging. The lodging rate is based on previous research related to similar projects in Southern Indiana. The number is derived from a survey of motels that offer weekly rates, and is updated to 2020 dollars using the the Bureau of Labor Statistics' Consumer Price Index.	

[6] This widely used modeling software relies on a variety of secondary data sources to build economic models that are tailored to reflect the unique industry mix of any given geographic area. For additional details on IMPLAN, see the Technical Appendix.

4 Findings and Results

Table 8 summarizes the modeled economic effects of Capital Dynamics' Ratts 2 development during construction. During installation, the economic effects in Knox County will largely be generated by the hiring of construction workers. Capital Dynamics estimates that the construction phase will take 10 to 12 months to complete and require 390,000 person-hours of labor. These hours translate to an estimated 188 full time equivalent (FTE) workers over the course of a year[7] who will earn roughly $13.3 million in total compensation. Up to 132 of these FTE workers will likely reside in the area, with another 56 FTEs coming to the worksite from outside of Indiana. These employment, payroll, and investment numbers are referred to as the "direct effects" of this project and are provided by Capital Dynamics based on best available information at the time of this report and are subject to change.

The additional economic activity created by the household spending of these workers, as well as the construction-related supply chain spending, will support an estimated 65 additional jobs over the duration of construction (approximately one year). These additional impacts are the "ripple effects." This brings the full employment footprint of construction activities to an estimated 253 FTE jobs in Knox County. This employment impact will combine to produce an estimated $15.9 million in total compensation.

A helpful way to interpret these effects is to look at the multipliers. The ratio of direct jobs to total jobs, for instance, gives a ratio of 1.35, meaning that every job directly tied to the construction phase of this project supports another 0.35 jobs with other employers in the county (or every 10 direct jobs support 3.5 additional jobs). The compensation multiplier of 1.20 suggests that every dollar of direct payroll generates an additional $0.20 in compensation with other local employers.

In terms of total economic activity, the full impact of the construction phase of this project will combine to contribute an estimated $20.9 million to Knox County's gross domestic product (GDP). The multiplier of 1.28 indicates that every dollar of GDP directly generated by these investments will trigger an additional $0.28 in economic activity in the area.

Table 8: Employment and Economic Impacts of Constructon Spending in Knox County

	Direct Effects	Ripple Effects	Total Effects	Multiplier
Employment (full-time equivalent)	188[a]	65	253	1.35
Employee Compensation (thousands, 2020 $)	$13,330.0	$2,599.5	$15,929.5	1.20
Gross Domestic Product (thousands, 2020 $)	$16,369.1	$4,503.9	$20,873.0	1.28
a. All of the direct construction jobs are counted as though they are in Knox County. However, Capital Dynamics expects that up to 56 of these workers will reside outside of the area. See Section 3 and the technical appendix for a discussion of the approaches used for estimating the spending related to local and non-local construction labor.				

[7] Note that the actual number of jobs may be higher or lower over the course of construction; however, the estimated labor hours average to 188 full-time equivalent employees for one year.

Once the Ratts 2 facility is fully installed, it will continue to provide an economic effect to Knox County through ongoing operation and maintenance activities, as summarized in Table 9. During a typical year of operation, Capital Dynamics expects that it will employ 4 FTE workers at the facility and spend almost $700,000 annually on compensation and other operating expenditures (direct effects).

This level of spending will support an additional 6 jobs in the county worth $229,000 in annual employee compensation (ripple effects). All told, the annual operation and maintenance activities for the Ratts 2 facility will support an estimated 10 jobs with $559,000 in annual compensation. The combined effects of facility operations will contribute an estimated $941,000 per year to Knox County's GDP.

Table 9: Employment and Economic Impacts of Facility Operations in Knox County

	Direct Effects	Ripple Effects	Total Effects	Multiplier
Employment (full-time equivalent)	4	6	10	2.50
Employee Compensation (thousands; 2020 $)	$330.0	$229.2	$559.2	1.69
Gross Domestic Product (thousands, 2020 $)	$656.9	$284.0	$940.9	1.43

5 References

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6 Technical Appendix

This appendix provides additional detail on the modeling software used to estimate economic effects (Section 6.1) and a glossary of key terms (Section 6.2).

6.1 IMPLAN Modeling

IMPLAN is built on a mathematical input-output (I-O) model that expresses relationships between sectors of the economy in a chosen geographic location. In expressing the flow of dollars through a regional economy, the input-output model assumes fixed relationships between producers and their suppliers based on demand. It also omits any dollars spent outside of the regional economy—say, by producers who import raw goods from another area, or by employees who commute and do their household spending elsewhere.

The idea behind I-O modeling is that the inter-industry relationships within a region largely determine how that economy will respond to economic changes. In an I-O model, the increase in demand for a certain product or service causes a multiplier effect, layers of effect that come in a chain reaction. Increased demand for a product affects the producer of the product, the producer's employees, the producer's suppliers, the supplier's employees, and so on—ultimately generating a total effect in the economy that is greater than the initial change in demand. The ratio of that overall effect to the initial change is called a regional multiplier and can be expressed as:

(Direct Effect + Ripple Effects) / (Direct Effect) = Multiplier

Multipliers are industry- and region-specific. Each industry has a unique output multiplier, because each industry has a different pattern of purchases from firms inside and outside of the regional economy. The output multiplier is in turn used to calculate income and employment multipliers.

IMPLAN constructs its I-O model using aggregated production, employment and trade data from a variety of secondary sources, such as the U.S. Census Bureau's annual *County Business Patterns* report and the U.S. Bureau of Labor Statistics' annual report called *Covered Employment and Wages*. In addition to gathering enormous amounts of data from government sources, the company also estimates some data where they haven't been reported at the level of detail needed (county-level production data, for instance), or where detail is omitted in government reports to protect the confidentiality of individual companies.

The IMPLAN modeling software includes predefined industry spending patterns and local purchasing coefficients which can be used to estimate economic impacts when these variables are unknown. In assessing the economic impact of the Ratts 2 development, analysts were instead able to construct a custom production function tailored to fit the specifics of the project, as detailed in Section 3, including a breakout of spending by categories including manufacturers, service providers, and workers located outside the immediate area. This approach greatly improved the accuracy of the economic impacts estimates.

6.2 Key Terminology

Direct Effects: The increase in final demand or employment in a given area that can be attributed specifically to Capital Dynamics proposed investments and operations.

Ripple Effects: A combination of the indirect and induced effects generated by the direct effects. Indirect effects measure the change in dollars or employment caused when Capital Dynamics increases its purchase of goods and services from suppliers and, in turn, those suppliers purchase more inputs and so on throughout the economy. Induced effects reflect the changes—whether in dollars or employment— that result from the household spending of direct workers, along with the employees in the supply chain.

Total Effects: The size of the economic impact, calculated as the sum of direct effects and ripple effects.

Multiplier: The magnitude of the economic response in a particular geographic area associated with a change in the direct effects, calculated as the total effect divided by the direct effect.

Gross Domestic Product (GDP): A measure of the economic activity generated by a company, industry, state, nation, etc., calculated as the difference between total output (i.e., sales) and the cost of production inputs. GDP consists of four components: employee compensation, proprietor income, other property income and indirect business tax.

7 Description of Authors

Dr. Kenneth Richards teaches and conducts research in the fields of sustainability and environmental policy at Indiana University's O'Neill School of Public and Environmental Affairs. His work combines academic research with policy advice to the public and private sector. In Masters of Business Administration (MBA) and Masters of Public Affairs (MPA) programs, he teaches sustainability management courses that include conceptual framing related to the business case for sustainability, business and society and the relation among the public, private and nonprofit sectors. He also holds appointments in environmental economics, policy and law at the Maurer School of Law and the Ostrom Workshop in Political Theory and Policy Analysis and frequently collaborates with Gnarly Tree Sustainability Institute (GTSI) on economic analyses of policies and projects in public and private sectors.

Kenneth obtained a Ph.D. from the Wharton School of Business and a J.D. from the Law School at the University of Pennsylvania. He also holds a Master of Science (M.S.) and a Bachelor of Science (B.S.) in Civil Engineering from Northwestern University and a Bachelor of Arts (B.A.) degree in Botany and Chemistry from Duke University. Previous appointments include the Oxford Martin School and the Smith School of Enterprise and the Environment, both at the University of Oxford, as well as a chaired visiting position in sustainability at the NUS Business School. He has also served as an economist at the U.S. Council of Economic Advisers in the Executive Office of the President, the U.S. Department of Agriculture's Economic Research Service, and the U.S. Department of Energy's Pacific Northwest National Laboratory.

Matthew Kinghorn is a senior analyst with the Indiana Business Research Center (IBRC) at Indiana University in Bloomington, where he has extensive experience conducting demographic and economic research projects. Examples include population projections for Indiana and its counties, community benchmarking studies, and economic impact analysis. He has published extensively in specialty publications such as Indiana Business Review and InContext. Additionally, Matt is an Indiana representative to the U.S. Census Bureau's Federal-State Cooperative for Population Estimates and a member of the Indiana Geographic Information Council.

Matt holds a B.A. in geography from Indiana University and an MPA from the O'Neill School. Prior to joining the IBRC, Matt worked with a community development consulting firm where he led a range of projects throughout Indiana including local economic development strategies, community needs assessments, and project feasibility studies.

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Emily earned her MPA and Masters of Science in Environmental Science from the O'Neill School, where she specialized in environmental economics and policy. She also holds a B.A. degree in Environmental Science and English from Ripon College. Before joining GTSI, Emily spent over eight years conducting cost, benefit, and economic impact analyses of environmental policies and regulations for the United States Environmental Protection Agency and other clients.