

IMPACT ANALYSIS OF THE MARCELLUS SHALE SAFE DRILLING INITIATIVE

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CORRECTED

MAY 30, 2014

Regional Economic
Studies Institute



APPROACH TO STUDY

1. Evaluation of **existing conditions** & engagement of residents/visitors in Western Maryland
2. Review of existing research about **community impacts** including
 - Community character,
 - Housing,
 - Roads and transportation, and
 - Recreation and tourism.
3. Collection of data and completion of analysis of **economic & fiscal impacts** including
 - Output,
 - Employment and wages,
 - State and local tax revenues, and
 - Property and land values.

COMMUNITY ENGAGEMENT

Findings from Stakeholder Interviews

- Location: Garrett College
- Dates: 6/26/2013 and 6/27/2013
- Findings
 - Tourism concerns
 - Economic and fiscal concerns
 - Community and housing concerns
 - Environmental and health concerns

COMMUNITY ENGAGEMENT

RESI's Survey

- Survey locations
 - In-person surveying (8/14/2013 and 8/15/2013): **158 on-site surveys**
 - Online surveying (8/23/2013–9/30/2013; webpage listed on the Garrett County Website and heavily promoted): **802 viable online surveys**
- Report discusses the findings and includes any conclusions that could be drawn from the data.
- RESI used the survey findings to complete the community impact analysis as well as the economic and fiscal impact analysis.

ASSUMPTIONS AND TOOLS

Assumptions and Methodology

Tools/Methodology

- IMPLAN vs. REMI PI+
- Contingent valuation
- Hedonic price analysis

Assumptions

- Scenario 1: 25 percent of the total shale gas would be extracted
- Scenario 2: 75 percent of the total shale gas would be extracted

ASSUMPTIONS AND TOOLS

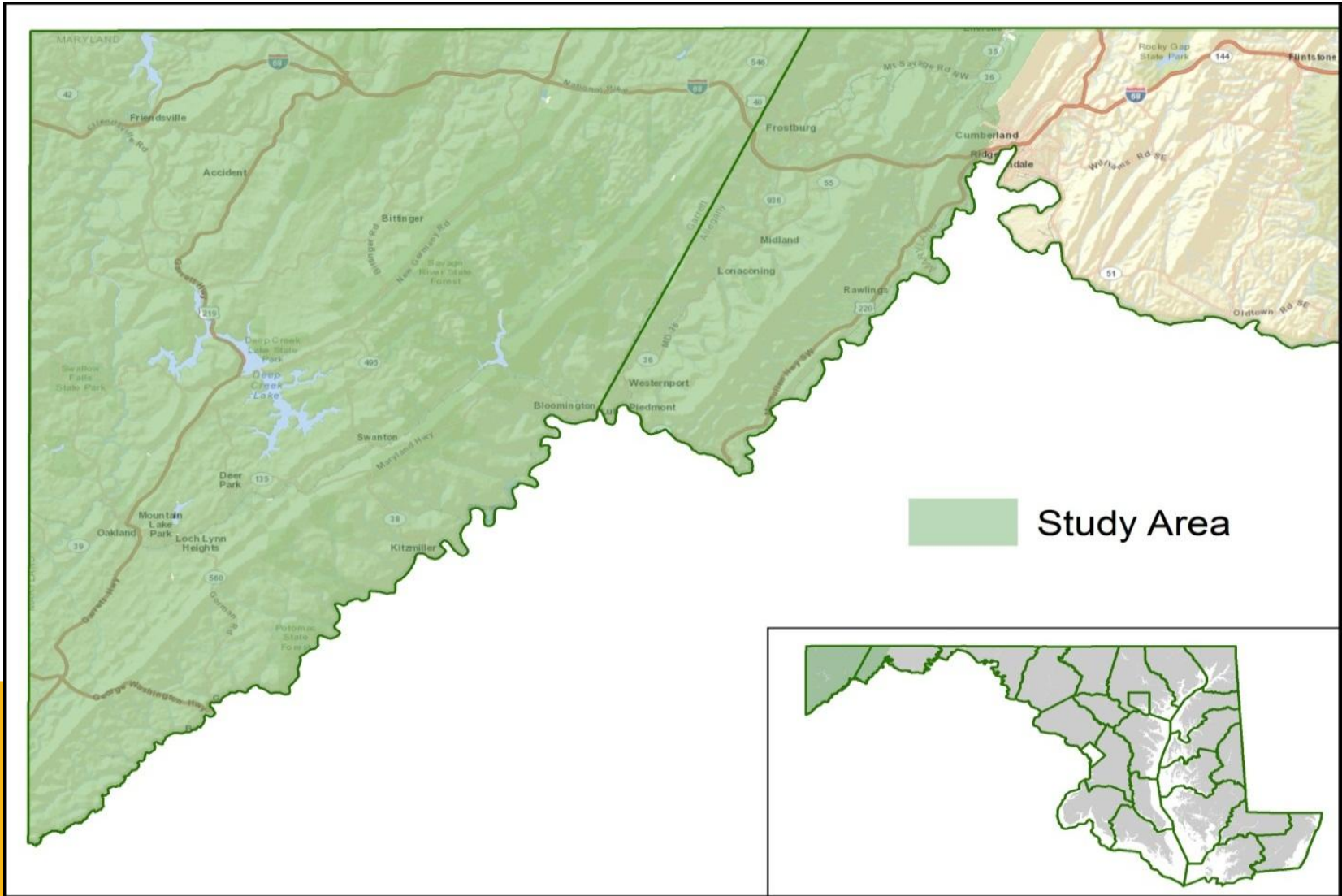
Well Pad Build Out

- A 2012 USGS report on well distributions estimated that an Interior AU Marcellus well could produce 1.158 bcf over its lifetime.
- Under Scenario 1 (25%), RESI estimated that producers will need approximately **150 wells** for recovery.
- Under Scenario 2 (75%), RESI estimated that producers will need approximately **450 wells** for recovery.

Production Curve

- Horizontal wells produce high recovery amounts in the first few years, then drop off significantly in later years.
- Using this curve, RESI estimated the level of production per well annually over the ten-year period.

ASSUMPTIONS AND TOOLS



ASSUMPTIONS AND TOOLS

Well Pad Build Out for Western Maryland—Scenario 1, 25 % Extraction

Year	Number of New Wells	Number of New Well Pads	Total Number of Wells	Total Number of Well Pads
2017	8	4	8	4
2018	16	4	24	8
2019	29	3	53	11
2020	22	3	75	14
2021	18	3	93	17
2022	15	2	108	19
2023	12	2	120	21
2024	12	2	132	23
2025	12	2	144	25
2026	6	0	150	25

Source: RESI

ASSUMPTIONS AND TOOLS

Well Pad Build Out for Western Maryland—Scenario 2, 75 % Extraction

Year	Number of New Wells	Number of New Well Pads	Total Number of Wells	Total Number of Well Pads
2017	36	12	36	12
2018	72	12	108	24
2019	63	9	171	33
2020	54	9	225	42
2021	63	9	288	51
2022	42	6	330	57
2023	36	6	366	63
2024	36	6	402	69
2025	36	6	438	75
2026	12	0	450	75

Source: RESI

COMMUNITY IMPACTS

Community Impacts

- Community impacts are often difficult to quantify and are potentially undervalued.
- Depth of the community impacts depends on the pace and scale of drilling activity, as well as the distribution of benefits (winners vs. losers).
- Boom-bust cycles, rapid pace of development, and mixed regulations are often observed in extractive industries, impacting
 - Short-term benefits vs. long-term costs and
 - Perceptions/stigma around drilling activity.
- Perceptions and stigma can disrupt communities, reduce rural character, and add stress to residents leading to increased social problems (crime, substance abuse, etc.).

COMMUNITY IMPACTS

Housing

- The housing analysis considers housing needs for all of Garrett County and Allegany County.
- RESI determined Western Maryland's capacity to accommodate the influx of residents from an increase in natural gas employment and associated population growth.
 - RESI does not expect rental housing to become unaffordable due to the relatively small number of wells expected in both drilling scenarios and the substantial housing surplus in the area.
 - For both drilling scenarios, Allegany County will experience a shortage in available housing as early as the third year of drilling.
 - For both drilling scenarios, Garrett County will not experience a housing shortage in available or currently unavailable housing units.

COMMUNITY IMPACTS

Projected Housing Surplus or Shortage—Allegany County

Category	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Baseline	2,655	2,536	2,398	1,765	1,572	1,355	1,118	873	371	110
Scenario 1 (25%)	2,592	2,475	2,277	1,648	1,398	1,189	959	724	231	(20)
Scenario 2 (75%)	2,590	2,407	2,208	1,515	1,270	1,008	729	446	(34)	(268)

Sources: MPD, REMI, RESI

COMMUNITY IMPACTS

Projected Housing Surplus or Shortage—Garrett County

Category	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Baseline	1,750	1,732	1,710	1,581	1,551	1,517	1,480	1,442	1,309	1,268
Scenario 1 (25%)	1,724	1,678	1,625	1,465	1,408	1,353	1,296	1,241	1,087	1,058
Scenario 2 (75%)	1,716	1,651	1,582	1,405	1,331	1,264	1,200	1,141	982	933

Sources: MPD, REMI, RESI

COMMUNITY IMPACTS

Truck Trips and Roads

- Truck traffic required for horizontal well drilling is “two to three times higher than the traffic associated with drilling a vertical well.”*
- Increased truck volume is a result of additional activity during site preparation and hauling of equipment, materials, water, and supplies.
- The magnitude of the impacts to truck traffic will depend on a number of factors: the number of well pads being developed, the number of wells per pad, and the total amount of water needed.
- Significant increases to trucking activity would not necessarily be present for the life of the well.

* New York State Department of Environmental Conservation, “Supplemental Generic Environmental Impact Statement,” 6-301.

COMMUNITY IMPACTS

Estimated Number of One-Way (Loaded) Truck Trips in Western Maryland—Scenario 1, 25% Extraction

Year	Heavy-Duty Trucks	Light-Duty Trucks	Total
2017	13,144	5,188	18,332
2018	24,648	8,916	33,564
2019	42,932	14,609	57,541
2020	32,866	11,347	44,213
2021	27,114	9,483	36,597
2022	22,390	7,720	30,110
2023	18,076	6,322	24,398
2024	18,076	6,322	24,398
2025	18,076	6,322	24,398
2026	8,628	2,796	11,424

Sources: All Consultants 2010, NTC Consultants 2011, NYSDEC 2011, MDE, RESI

COMMUNITY IMPACTS

Estimated Number of One-Way Truck Trips for Western Maryland—Scenario 2, 75% Extraction

Year	Heavy-Duty Trucks	Light-Duty Trucks	Total
2017	56,688	21,156	77,844
2018	108,456	37,932	146,388
2019	94,284	32,643	126,927
2020	81,342	28,449	109,791
2021	94,284	32,643	126,927
2022	62,856	21,762	84,618
2023	54,228	18,966	73,194
2024	54,228	18,966	73,194
2025	54,228	18,966	73,194
2026	17,256	5,592	22,848

Sources: All Consultants 2010, NTC Consultants 2011, NYSDEC 2011, MDE, RESI

RECREATION AND TOURISM

Tourism

Key concerns regarding the tourism industry during stakeholder meetings were the following:

- Visitor and resident perceptions of Garrett County,
 - How shale development might change the local supply of labor, and
 - The availability and cost of resources.
-
- Tourism, recreation, and entertainment industries are vulnerable to changes in labor costs and supply.
 - Nearby drilling activity in Pennsylvania and West Virginia has already attracted commercial drivers away from Garrett County businesses and into higher paying jobs in the natural gas industry.
 - This transfer of labor from tourism to energy can place upward pressure on labor costs at rates that some employers will simply be unable to match.

RECREATION AND TOURISM

Tourism

- RESI's research did identify some potential impacts of the presence of drilling activity in Western Maryland.
 - These **impacts are reliant both on actual and perceived changes** brought on by drilling activity.
- Survey responses revealed potential for changes in how and where people participate in outdoor recreation in Western Maryland.
 - Specifically, nonresidents may have more flexibility to avoid Western Maryland if they perceive the local trails, streams, and woodlands to be of lesser quality near drilling activity—**ultimately impacting the popular second-home market of Garrett County.**
- Tourists may have to compete with shale workers for hotel rooms both in terms of availability and room rates, depending on the level of drilling activity.

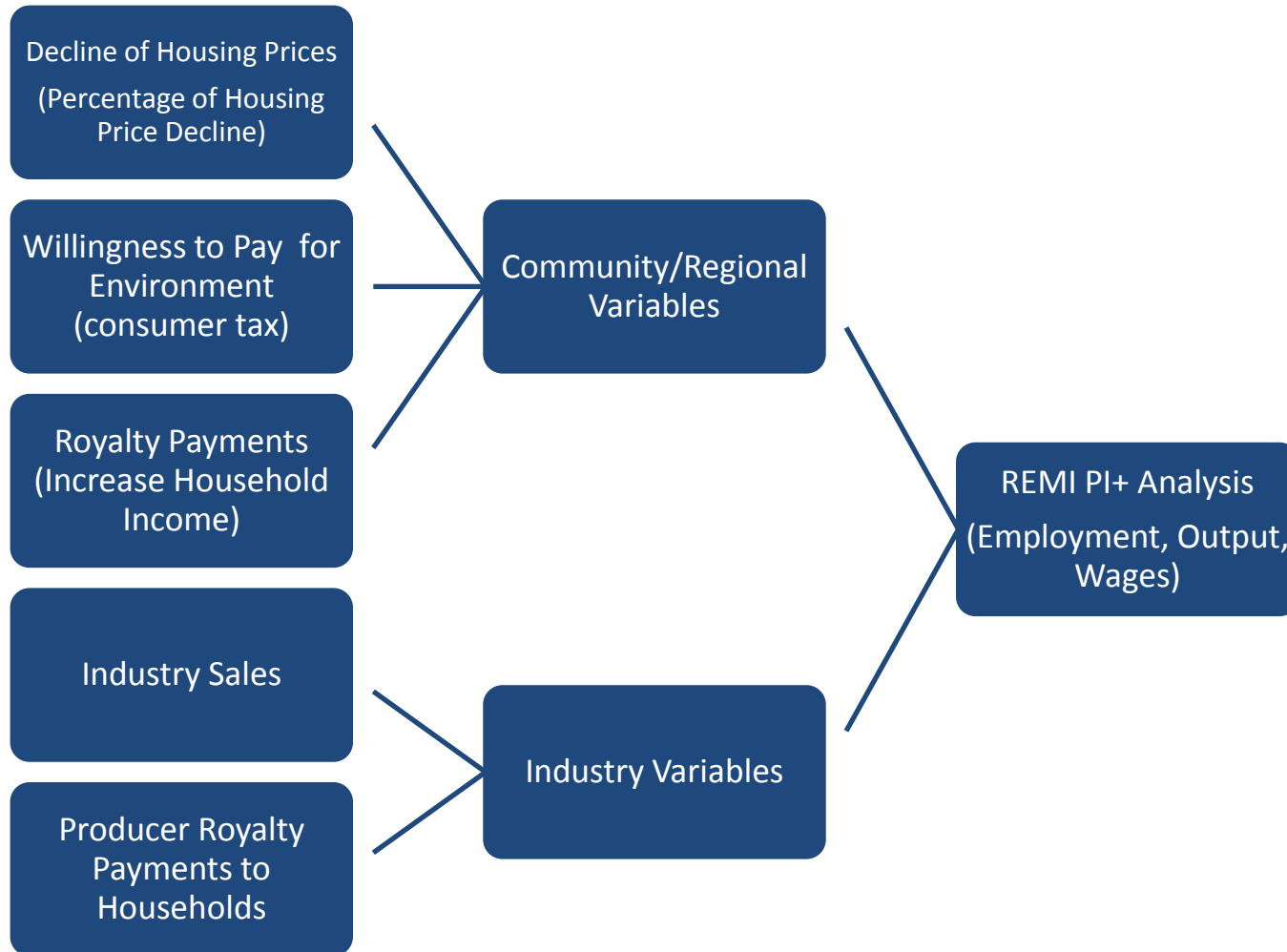
ECONOMIC AND FISCAL IMPACTS

Economic and Fiscal Impacts

- To analyze the economic and fiscal impacts associated with Marcellus Shale drilling in Western Maryland, RESI used several economic modeling tools including a **dynamic input/output model**, a **willingness to pay model**, and a **hedonic pricing model**.
- RESI incorporated key economic drivers into the REMI PI+ model and analyzed the results for employment, output, and wages over a twenty-year period.

ECONOMIC AND FISCAL IMPACTS

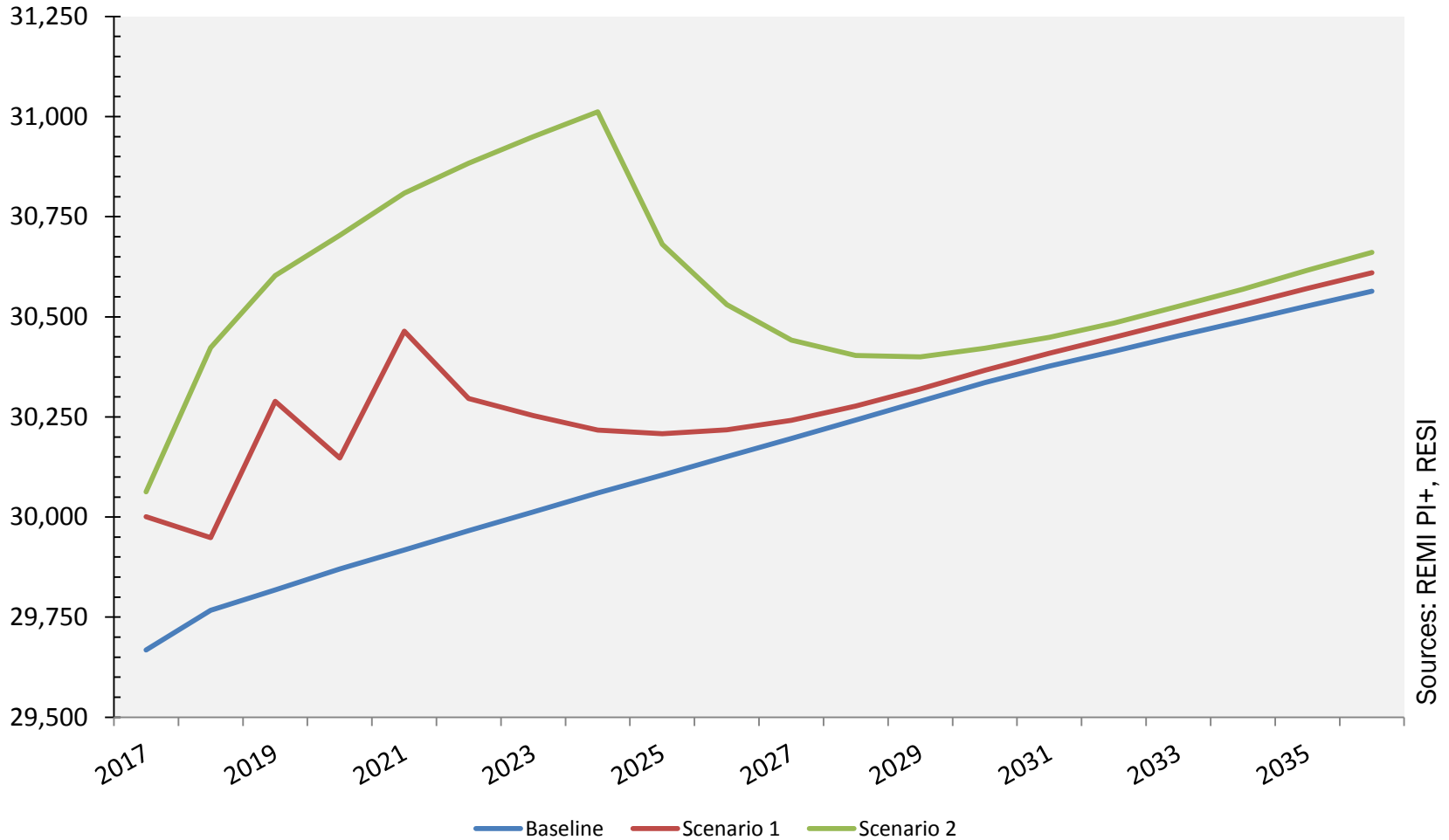
Model Inputs and Outputs



ECONOMIC AND FISCAL IMPACTS

Employment Impacts

Employment Impacts from Shale Drilling in Allegany County



Sources: REMI PI+, RESI

ECONOMIC AND FISCAL IMPACTS

Employment Impacts for Allegany County, number of jobs

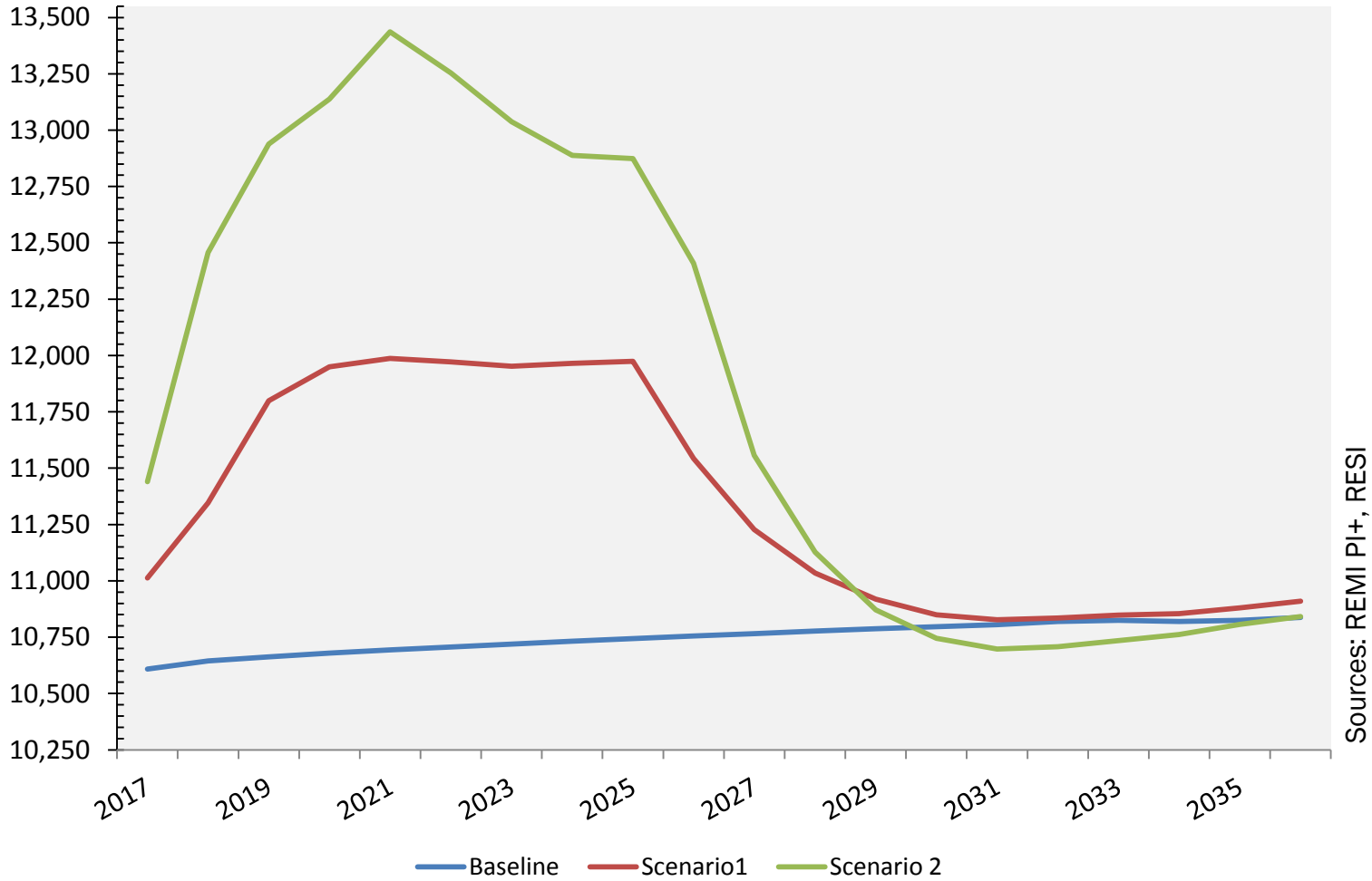
Year	Scenario 1–25%	Scenario 2–75%
2017	332.7	395.0
2018	181.7	655.9
2019	471.1	785.3
2020	277.4	833.4
2021	546.3	890.6
2022	329.8	917.8
2023	240.3	937.0
2024	157.3	951.7
2025	103.4	576.0
2026	66.9	379.7
2027	45.7	246.1
2028	35.4	161.2
2029	30.6	111.0
2030	30.3	85.3
2031	32.2	71.9
2032	34.8	70.7
2033	37.3	73.9
2034	40.5	80.0
2035	43.8	88.9
2036	46.2	96.7

Sources: REMI PI+, RESI

ECONOMIC AND FISCAL IMPACTS

Employment Impacts

Employment Impacts from Shale Drilling in Garrett County



Sources: REMI PI+, RESI

ECONOMIC AND FISCAL IMPACTS

Employment Impacts for Garrett County, number of jobs

Year	Scenario 1–25%	Scenario 2–75%
2017	404.5	832.0
2018	701.4	1,812.0
2019	1,136.3	2,274.8
2020	1,271.3	2,458.9
2021	1,293.6	2,742.8
2022	1,265.1	2,547.7
2023	1,233.6	2,317.7
2024	1,233.4	2,156.6
2025	1,230.2	2,129.6
2026	788.5	1,654.4
2027	461.5	790.5
2028	257.0	350.8
2029	131.4	83.9
2030	52.6	-51.6
2031	20.9	-108.9
2032	15.8	-111.5
2033	22.9	-90.9
2034	35.1	-57.1
2035	55.0	-18.3
2036	72.3	-2.9

Sources: REMI PI+, RESI

ECONOMIC AND FISCAL IMPACTS

Fiscal Impacts for Allegany County

Year	Scenario 1–25%	Scenario 2–75%
2017	\$311,443	\$1,325,248
2018	\$1,088,658	\$1,603,680
2019	\$535,160	\$1,782,967
2020	\$1,329,524	\$1,989,003
2021	\$715,833	\$2,149,244
2022	\$612,128	\$2,304,598
2023	\$492,806	\$2,448,735
2024	\$407,929	\$1,557,030
2025	\$343,021	\$1,261,708
2026	\$298,618	\$1,033,940
2027	\$276,413	\$876,133
2028	\$258,853	\$762,326
2029	\$252,887	\$695,816
2030	\$246,631	\$641,375
2031	\$250,054	\$625,388
2032	\$248,712	\$618,223
2033	\$257,553	\$614,016
2034	\$268,381	\$633,546
2035	\$279,225	\$657,242
2036	\$280,797	\$678,318

Sources: REMI PI+, RESI

ECONOMIC AND FISCAL IMPACTS

Fiscal Impacts for Garrett County

Year	Scenario 1–25%	Scenario 2–75%
2017	\$1,410,008	\$3,102,644
2018	\$2,164,211	\$3,946,411
2019	\$2,491,759	\$4,441,773
2020	\$2,677,123	\$5,150,727
2021	\$2,782,592	\$5,098,345
2022	\$2,893,150	\$4,995,218
2023	\$3,042,990	\$4,962,616
2024	\$3,179,325	\$5,128,212
2025	\$2,159,205	\$4,471,466
2026	\$1,623,522	\$2,676,789
2027	\$1,257,384	\$1,900,064
2028	\$1,000,143	\$1,345,089
2029	\$807,833	\$1,000,170
2030	\$694,358	\$778,681
2031	\$636,632	\$667,377
2032	\$605,819	\$605,848
2033	\$594,141	\$581,475
2034	\$617,736	\$597,264
2035	\$639,913	\$628,592
2036	\$667,900	\$658,399

Sources: REMI PI+, RESI

SUMMARY & CONCLUSIONS

- In the case of both scenarios modeled by RESI, **both counties will experience an economic “boom” and then a “bust”** associated with Marcellus Shale drilling.
- Factors such as housing values, industry sales, royalty payments, and willingness to pay for wilderness conservation were determined to be key indicators of economic change associated with Marcellus Shale drilling.
- The size and scope of the economy prior to shale drilling and the amount of drilling to take place can affect how heavily a region is impacted.



**QUESTIONS
&
COMMENTS**