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BACKGROUNDER

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The Obama Administration's Climate Agenda Will Hit Manufacturing Hard: A State-by-State Analysis

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Abstract

Building on an earlier study of the economic impact of Obama Administration climate policies, this study breaks down the employment impacts of new regulations by state and congressional district. The climate regulations disproportionately and negatively impact states and districts with higher-than-average employment in manufacturing or mining.

In an earlier study, we examined the economic impact of climate change–related regulations at the national level and found devastating job losses over the course of the next two decades. In this study, we quantify this impact by state and congressional district. Not surprisingly, we find that all states would suffer from this policy. Given these results and the regulations' negligible positive impact on the climate and the environment, policymakers should avoid instituting these potentially burdensome regulations.

Overview

The Obama Administration has put forward a variety of rules and goals aimed at cutting carbon dioxide emissions. These rules would drive up energy costs, reduce economic activity, and disrupt job markets. A previous Heritage Foundation study outlined the projected economic impact of such policy.[1] It found by 2030:

- An average employment shortfall of nearly 300,000 jobs,
- A peak employment shortfall of more than 1 million jobs,
- 500,000 jobs lost in manufacturing,

Key Points

- The Obama Administration has put forward a variety of rules and goals aimed at cutting carbon dioxide emissions by regulating motor vehicles and new and existing power plants.
- Even though the regulations would have a negligible positive impact on the climate and the environment, the Obama Administration has moved ahead.
- These rules would drive up energy costs, reduce economic activity, and disrupt job markets.
- Every state would experience overwhelmingly negative impacts as a result of these regulations.
- Because the regulations would disproportionately affect manufacturing jobs, state economies that are manufacturing-intensive can expect disproportionate employment losses.
- The Heritage Foundation has modeled how the regulations will affect manufacturing jobs in each state and congressional district.

This paper, in its entirety, can be found at **http://report.heritage.org/bg2990**

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- Destruction of more than 45 percent of coal-mining jobs,
- A loss of more than $2.5 trillion (inflation-adjusted) in aggregate gross domestic product, and
- A total income loss of more than $7,000 (inflation-adjusted) per person.

In the current study, job impacts are disaggregated to show potential effects by state and by congressional district. Because manufacturing jobs are disproportionately affected, state economies that are manufacturing-intensive can expect disproportionate employment losses.

The Proposed Regulations

For decades, environmental activist organizations have pushed to regulate carbon dioxide emissions. Even though such regulations would have a negligible positive impact on the climate and the environment, the Obama Administration has introduced a series of measures aimed at controlling emissions from motor vehicles and power plants, both new and existing.[2] The economic basis for these regulations has been the social cost of carbon (SCC).

Derived from integrated assessment models (IAMs), the SCC supposedly quantifies the economic damages associated with carbon dioxide emissions. Although conceptually appealing and technically sophisticated in many ways, the IAMs suffer from inherent flaws, including unrealistic assumptions about the costs of future damages, the temperature changes caused by increased carbon dioxide emissions into the atmosphere, and the time horizon (nearly 300 years into the future). Because of these flaws, the IAMs are fundamentally unsuitable for regulatory application.[3]

The Economic Impact by State

In the earlier study, we used the Heritage Energy Model (HEM) to quantify the economic impact that such regulations based on the SCC would have on the American economy.[4] To estimate the economic impact of the Administration's regulatory scheme, based on an estimated SCC of $37 per ton, we modeled the impact of an equivalent tax of $37 per ton of carbon emissions[5] instituted in 2015 and increasing according to the EPA's annual SCC estimates.[6] Taxing CO_2-emitting energy incentivizes businesses and consumers to change production processes, technologies, and behavior in a manner comparable to the Administration's regulatory scheme. To neutralize the analytical impacts of a tax's income transfer, we model a scenario in which 100 percent of carbon-tax revenue is returned to taxpayers.

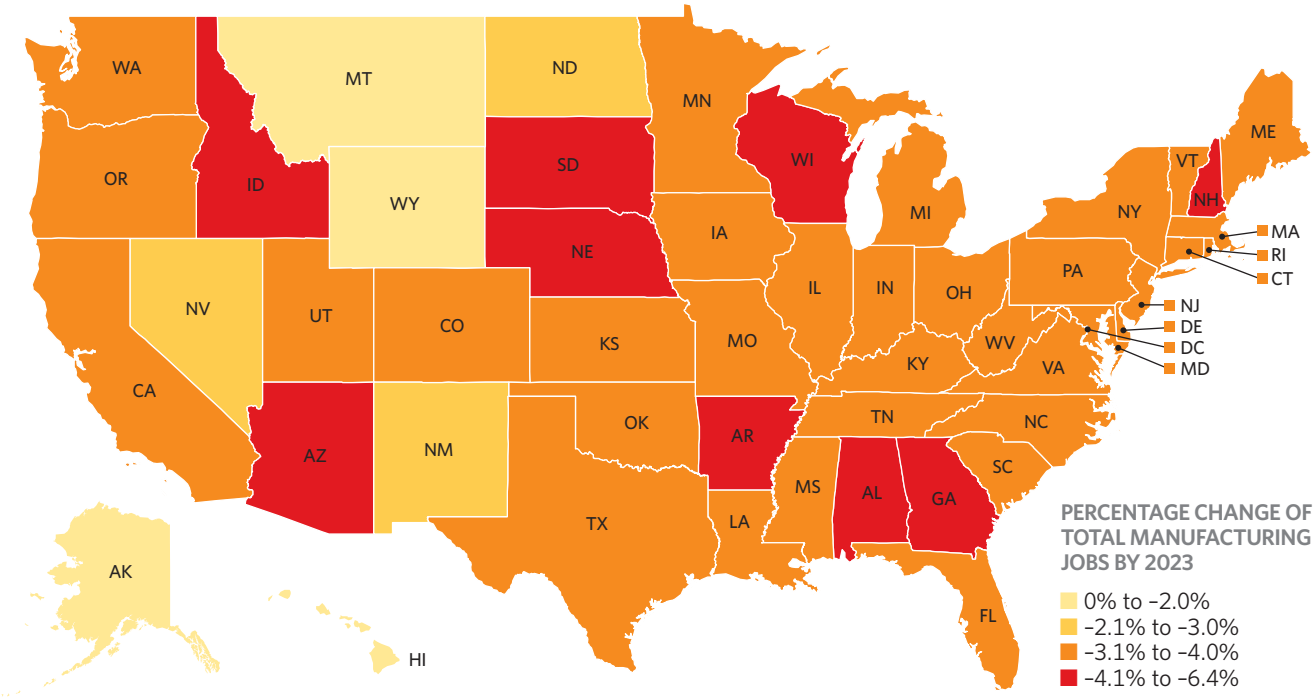
Map 1 shows the impact of such a regulatory scheme on manufacturing jobs by state eight years from now (the midpoint of the period analyzed).[7]

1. Kevin D. Dayaratna, Nicolas D. Loris, and David W. Kreutzer, "The Obama Administration's Climate Agenda: Underestimated Costs and Exaggerated Benefits," Heritage Foundation *Backgrounder* No. 2975, http://www.heritage.org/research/reports/2014/11/the-obama-administrations-climate-agenda-underestimated-costs-and-exaggerated-benefits.
2. Ibid.
3. Kevin D. Dayaratna and David W. Kreutzer, "Unfounded FUND: Yet Another EPA Model Not Ready for the Big Game," Heritage Foundation *Backgrounder* No. 2897, http://www.heritage.org/research/reports/2014/04/unfounded-fund-yet-another-epa-model-not-ready-for-the-big-game, and Kevin D. Dayaratna and David W. Kreutzer, "Loaded DICE: An EPA Model Not Ready for the Big Game," Heritage Foundation *Backgrounder* No. 2860, November 21, 2013, http://www.heritage.org/research/reports/2013/11/loaded-dice-an-epa-model-not-ready-for-the-big-game.
4. Dayaratna et al., "The Obama Administration's Climate Agenda."
5. Although we refer to a "$37 carbon tax," this is shorthand for the SCC schedule produced by the Interagency Working Group in 2013. It is $37 per ton of CO_2 in 2020, but lower in earlier years and higher in subsequent years.
6. U.S. Interagency Working Group on Social Cost of Carbon, "Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," The White House, revised November 2013, p. 18, http://www.whitehouse.gov/sites/default/files/omb/assets/inforeg/technical-update-social-cost-of-carbon-for-regulator-impact-analysis.pdf (accessed December 23, 2014).
7. Our analysis covered the period to 2030. We chose 2023 in this study because it is a reasonable representation of the average economic impact of the policy across the entire time horizon. These results were calculated using results from the Heritage Energy Model, using employment data from the American Community Survey in order to calculate the impact in various congressional districts. U.S. Census Bureau, American Community Survey, http://www.census.gov/acs/www/ (accessed December 23, 2014). For a more detailed explanation of HEM's methodology, see the Appendix.

MAP 1

EPA Regulations Would Eliminate 586,000 Manufacturing Jobs

EPA regulations on carbon dioxide emissions would significantly impact the U.S. manufacturing sector. By 2023, 34 states would lose 3–4 percent of their manufacturing jobs, and nine other states would lose more.



State	Jobs Lost	% Total
Alabama	10,718	-4.14%
Alaska	524	-1.59%
Arizona	7,964	-4.02%
Arkansas	6,826	-4.16%
California	65,330	-3.62%
Colorado	7,116	-3.80%
Connecticut	7,571	-3.94%
Delaware	1,605	-3.47%
District of Columbia	147	-0.34%
Florida	17,314	-3.77%
Georgia	18,082	-4.10%
Hawaii	773	-0.97%
Idaho	2,695	-5.76%
Illinois	29,868	-3.72%
Indiana	21,848	-3.76%
Iowa	8,968	-3.74%
Kansas	6,871	-3.72%

State	Jobs Lost	% Total
Kentucky	9,819	-3.40%
Louisiana	6,288	-3.53%
Maine	2,371	-3.30%
Maryland	5,893	-3.36%
Massachusetts	12,080	-3.82%
Michigan	28,294	-3.71%
Minnesota	14,771	-3.67%
Mississippi	6,068	-3.80%
Missouri	12,500	-3.76%
Montana	839	-1.75%
Nebraska	3,974	-4.32%
Nevada	2,006	-2.40%
New Hampshire	3,452	-6.39%
New Jersey	14,827	-3.58%
New Mexico	1,727	-2.39%
New York	24,196	-3.89%
North Carolina	20,996	-3.63%

State	Jobs Lost	% Total
North Dakota	1,037	-2.33%
Ohio	31,747	-3.82%
Oklahoma	6,497	-3.09%
Oregon	7,643	-3.84%
Pennsylvania	28,926	-3.69%
Rhode Island	2,260	-3.16%
South Carolina	10,731	-3.70%
South Dakota	1,622	-5.05%
Tennessee	14,159	-3.51%
Texas	42,760	-3.74%
Utah	5,431	-3.51%
Vermont	1,378	-3.41%
Virginia	11,503	-3.41%
Washington	13,077	-3.79%
West Virginia	2,467	-3.25%
Wisconsin	20,421	-4.19%
Wyoming	489	-0.58%

Source: Authors' calculations based on data from the Heritage Energy Model. For more information, see the Appendix.

As the numbers illustrate, all states would experience overwhelmingly negative impacts as a result of these regulations.

The Appendix includes these results by congressional district.

Although the economic damages from the Obama Administration's energy-stifling carbon policy will be overarching, these damages will clearly impact manufacturing jobs all across the country. Most notably, states with manufacturing-intensive economies will suffer a great deal as a result of this policy. As a result, policymakers should avoid imposing these destructive policies on such an integral component of the American economy.

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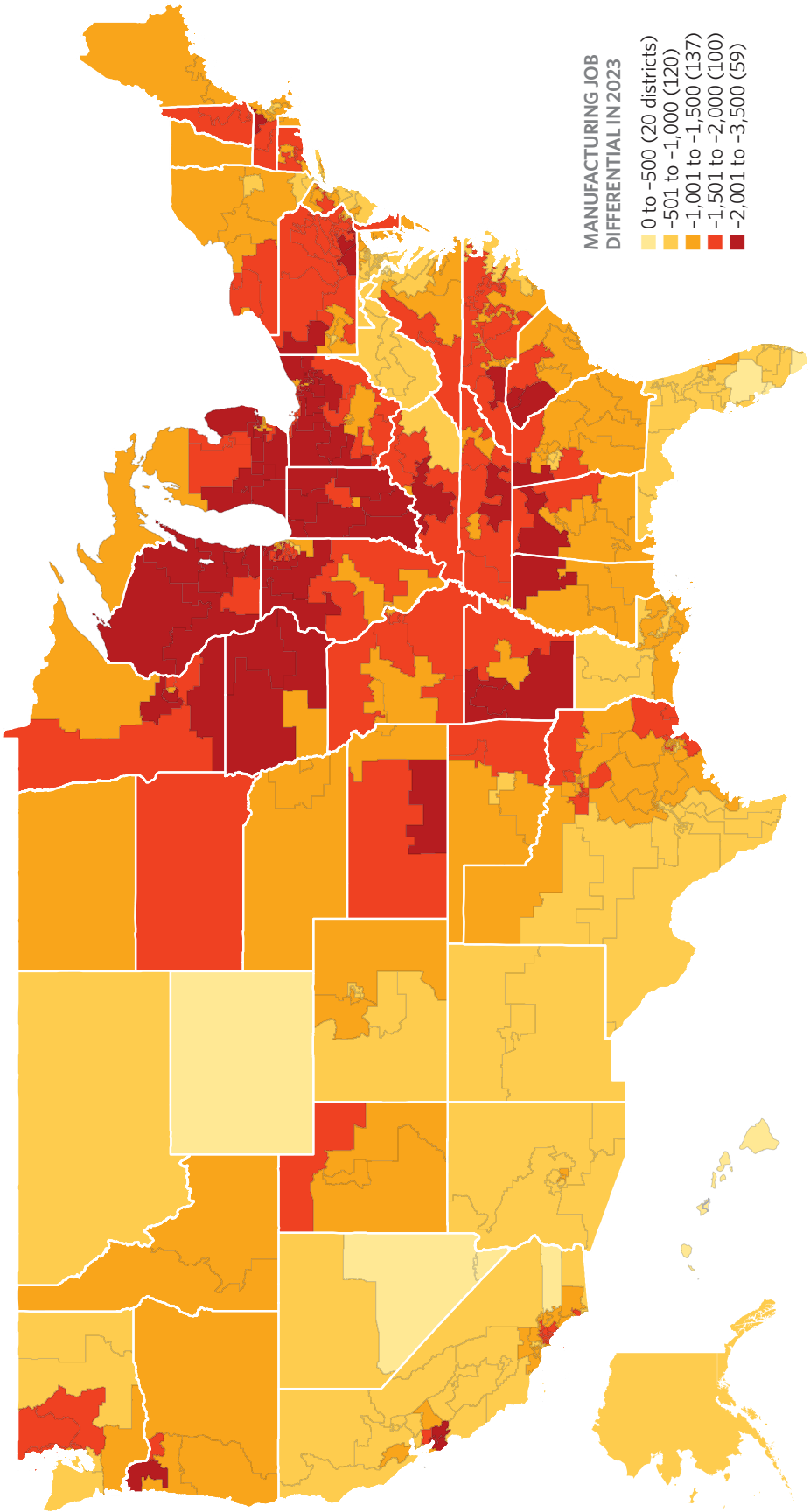
MAP 2

Where EPA Regulations Would Hit the Hardest

States in the Midwest would lose the largest number of manufacturing jobs due to proposed EPA regulations on carbon dioxide emissions. A total of 296 U.S. congressional districts would lose 1,000 or more jobs.



Source: Authors' calculations based on data from the Heritage Energy Model. For more information, see the Appendix.

Appendix

Appendix Table 1 shows the economic impact of the regulations modeled in this study by congressional district.

Methodology

Overview of Heritage Energy Model. This analysis utilizes the Heritage Energy Model (HEM), a derivative of the National Energy Model System 2014 Full Release (NEMS).[8] NEMS is used by the Energy Information Administration (EIA) in the Department of Energy as well as various nongovernmental organizations for a variety of purposes, including forecasting the effects of energy policy changes on a plethora of leading economic indicators. The methodologies, assumptions, conclusions, and opinions in this report are entirely the work of statisticians and economists in the Center for Data Analysis (CDA) at The Heritage Foundation and have not been endorsed by, and do not necessarily reflect the views of, the developers of NEMS.

HEM is based on well-established economic theory as well as historical data and contains a variety of modules that interact with each other for long-term forecasting. In particular, HEM focuses on the interactions among (1) the supply, conversion, and demand of energy in its various forms; (2) American energy and the overall American economy; (3) the American energy market and the world petroleum market; and (4) current production and consumption decisions as well as expectations about the future.[9] These modules include:

- Macroeconomic Activity Module,[10]
- Transportation Demand Module,
- Residential Demand Module,
- Industrial Demand Module,
- Commercial Demand Module,
- Coal Market Module,
- Electricity Market Module,
- Liquid Fuels Market Module,
- Oil and Gas Supply Module,
- Renewable Fuels Module,
- International Energy Activity Module, and
- Natural Gas Transmission and Distribution Module.

HEM is identical to the EIA's NEMS with the exception of the Commercial Demand Module. Unlike NEMS, this module does not make projections regarding commercial floor-space data of pertinent commercial buildings. Other than that, HEM is identical to NEMS.

Overarching the modules is the Integrating Module, which consistently cycles, iteratively executing and allowing these various modules to interact with each other. Unknown variables that are related, such as a component of a particular module, are grouped together, and a pertinent subsystem of equations and inequalities corresponding to each group is solved via a variety of commonly used numerical analytic techniques, using approximate values for the other unknowns. Once these group's values are computed, the next group is solved similarly and the process iterates. Convergence checks are performed for each statistic to determine whether subsequent changes in that particular statistic fall within a given tolerance. After all group values for the current cycle are determined, the next cycle begins. For example, at cycle *j*, a variety of *n* pertinent statis-

8. U.S. Department of Energy, Energy Information Administration, "The National Energy Modeling System: An Overview," October 2009, http://www.eia.gov/oiaf/aeo/overview/pdf/0581(2009).pdf (accessed April 3, 2013).
9. Ibid., pp. 3–4.
10. HEM's Macroeconomic Activity Module uses the IHS Global Insight model, which is used by government agencies and Fortune 500 organizations to forecast the effects of economic events and policy changes on notable economic indicators. As with NEMS, the methodologies, assumptions, conclusions, and opinions in this report are entirely the work of CDA statisticians and economists and have not been endorsed by, and do not necessarily reflect the views of, the owners of the IHS Global Insight model.

tics represented by the vector, $\left(x_1^j, x_2^j, \ldots, x_n^j\right) \in R^n$ is obtained.[11] HEM provides a number of diagnostic measures, based on differences between cycles, to indicate whether a stable solution has been achieved.

Carbon Tax Simulations and Diagnostics. We used the HEM to analyze the economic effects of instituting a $37 carbon tax based on the EPA's estimation of the SCC assuming a 3 percent discount rate. HEM is appropriate for this analysis because similar models have been used in the past to understand the economic effects of other carbon tax proposals.[12] In particular, we conducted simulations running a carbon fee that started in 2015 at $37 (in 2007 dollars per metric ton of carbon dioxide) and followed the schedule presented by the Obama Administration through the year 2040.[13] We chose a revenue-neutral carbon tax that returns 100 percent of the carbon tax revenues directly to taxpayers. We ran the HEM for 12 cycles to get consistent feedback into the Macroeconomic Activity Module, which provided us with the figures presented in this study. Since we are modeling the proposed regulations as a tax, the economic impact is likely understated because actual regulations would have a more stifling impact on the economy.

The diagnostic tests suggested that the forecasts provided by the model had stabilized at the end of the 12 runs, based on differences between cycles. The 12 cycles were therefore sufficient to attain meaningful convergence, thus providing us with macroeconomic statistics from which we could make informative statistical inferences.

Translating National Employment Impacts to Local Impacts. To estimate employment differentials, two employment trajectories were created for each state and congressional district: a baseline trajectory and a policy trajectory. Initial manufacturing employment levels for each state or district were multiplied by the national manufacturing employment growth factors for each year for both the baseline and policy cases estimated using the HEM.[14] The three categories were totaled to calculate total employment for the baseline and policy cases.

11. Steven A. Gabriel, Andy S. Kydes, and Peter Whitman, "The National Energy Modeling System: A Large-Scale Energy-Economic Equilibrium Model," *Operations Research*, Vol. 49, No. 1 (January–February 2001), pp. 14–25, http://pubsonline.informs.org/doi/pdf/10.1287/opre.49.1.14.11195 (accessed December 23, 2014).
12. For example, the Department of Energy has used NEMS to evaluate some policy proposals. See U.S. Department of Energy, Energy Information Administration, "AEO Table Browser," http://www.eia.gov/oiaf/aeo/tablebrowser/ (accessed January 2, 2015).
13. U.S. Interagency Working Group on Social Cost of Carbon, "Technical Support Document," p. 18.
14. Initial employment levels for the three employment categories were taken from the U.S. Census Bureau, American Community Survey.

APPENDIX TABLE 1

The Effect of EPA Regulations on Manufacturing Jobs, by Congressional District (Page 1 of 2)

MANUFACTURING JOB DIFFERENTIAL IN 2023

Alabama	
1	-1,276
2	-1,418
3	-1,788
4	-2,050
5	-1,809
6	-1,167
7	-1,209
Total	-10,718

Alaska	
	-524

Arizona	
1	-667
2	-776
3	-715
4	-619
5	-1,366
6	-853
7	-972
8	-788
9	-1,208
Total	-7,964

Arkansas	
1	-1,687
2	-1,042
3	-2,095
4	-2,002
Total	-6,826

California	
1	-622
2	-816
3	-814
4	-755
5	-1,280
6	-603
7	-745
8	-632
9	-938
10	-1,385
11	-820
12	-955
13	-927
14	-1,021
15	-1,721
16	-934
17	-3,174
18	-2,230
19	-2,224
20	-755
21	-649
22	-740
23	-715
24	-920
25	-1,441
26	-1,248
27	-1,091
28	-875
29	-1,324
30	-1,059
31	-1,115
32	-1,562
33	-1,310
34	-1,452
35	-1,675
36	-451
37	-819
38	-1,678
39	-1,718
40	-1,990
41	-1,192
42	-1,397
43	-1,364
44	-1,644
45	-1,758
46	-1,954
47	-1,507
48	-1,690
49	-1,217
50	-1,159
51	-792
52	-1,510
53	-968
Total	-65,330

Colorado	
1	-900
2	-1,349
3	-635
4	-1,270
5	-831
6	-936
7	-1,196
Total	-7,116

Connecticut	
1	-1,477
2	-1,774
3	-1,606
4	-1,013
5	-1,701
Total	-7,571

Delaware	
	-1,605

District of Columbia	
Total	-147

Florida	
1	-585
2	-515
3	-577
4	-754
5	-693
6	-686
7	-719
8	-1,116
9	-532
10	-627
11	-509
12	-633
13	-997
14	-691
15	-765
16	-708
17	-433
18	-613
19	-381
20	-500
21	-527
22	-650
23	-687
24	-487
25	-883
26	-461
27	-588
Total	-17,314

Georgia	
1	-1,125
2	-1,087
3	-1,587
4	-1,028
5	-726
6	-1,056
7	-1,238
8	-1,105
9	-1,794
10	-1,274
11	-1,299
12	-1,314
13	-966
14	-2,484
Total	-18,082

Hawaii	
1	-447
2	-326
Total	-773

Idaho	
1	-1,392
2	-1,303
Total	-2,695

Illinois	
1	-863
2	-1,172
3	-1,572
4	-2,189
5	-1,415
6	-1,938
7	-926
8	-2,285
9	-1,152
10	-2,025
11	-1,761
12	-1,263
13	-1,248
14	-2,139
15	-1,844
16	-2,238
17	-2,143
18	-1,695
Total	-29,868

Indiana	
1	-2,059
2	-3,271
3	-3,397
4	-2,447
5	-1,742
6	-2,660
7	-1,483
8	-2,593
9	-2,197
Total	-21,848

Iowa	
1	-2,682
2	-2,568
3	-1,364
4	-2,353
Total	-8,968

Kansas	
1	-1,682
2	-1,455
3	-1,295
4	-2,439
Total	-6,871

Kentucky	
1	-1,891
2	-2,110
3	-1,420
4	-1,808
5	-953
6	-1,638
Total	-9,819

Louisiana	
1	-1,015
2	-966
3	-1,149
4	-949
5	-823
6	-1,385
Total	-6,288

Maine	
1	-1,252
2	-1,120
Total	-2,371

Maryland	
1	-1,170
2	-901
3	-786
4	-512
5	-527
6	-815
7	-609
8	-574
Total	-5,893

Massachusetts	
1	-1,530
2	-1,683
3	-2,186
4	-1,379
5	-1,071
6	-1,431
7	-785
8	-988
9	-1,028
Total	-12,080

Michigan	
1	-1,245
2	-2,791
3	-2,310
4	-1,816
5	-1,505
6	-2,560
7	-2,171
8	-2,061
9	-2,256
10	-2,661
11	-2,496
12	-1,734
13	-1,395
14	-1,293
Total	-28,294

Minnesota	
1	-2,291
2	-1,801
3	-2,109
4	-1,684
5	-1,393
6	-2,227
7	-1,981
8	-1,284
Total	-14,771

Note: Figures may not sum to totals due to rounding.
Source: Authors' calculations based on data from the Heritage Energy Model.

APPENDIX TABLE 1

The Effect of EPA Regulations on Manufacturing Jobs, by Congressional District (Page 2 of 2)

MANUFACTURING JOB DIFFERENTIAL IN 2023

Mississippi	
1	-2,091
2	-1,201
3	-1,298
4	-1,478
Total	–6,068

Missouri	
1	-1,155
2	-1,647
3	-1,901
4	-1,379
5	-1,336
6	-1,782
7	-1,537
8	-1,763
Total	–12,500

Montana	
Total	-839

Nebraska	
1	-1,466
2	-1,077
3	-1,431
Total	–3,974

Nevada	
1	-332
2	-847
3	-459
4	-368
Total	–2,006

New Hampshire	
1	-1,618
2	-1,834
Total	–3,452

New Jersey	
1	-1,081
2	-870
3	-921
4	-902
5	-1,352
6	-1,277
7	-1,761
8	-1,318
9	-1,616
10	-794
11	-1,481
12	-1,455
Total	–14,827

New Mexico	
1	-670
2	-525
3	-532
Total	–1,727

New York	
1	-883
2	-1,330
3	-701
4	-644
5	-546
6	-569
7	-801
8	-369
9	-398
10	-593
11	-477
12	-599
13	-507
14	-619
15	-414
16	-462
17	-744
18	-930
19	-1,027
20	-864
21	-1,143
22	-1,467
23	-1,877
24	-1,386
25	-1,656
26	-1,291
27	-1,900
Total	–24,196

North Carolina	
1	-1,515
2	-1,830
3	-975
4	-1,072
5	-1,932
6	-1,937
7	-1,451
8	-1,937
9	-1,460
10	-2,308
11	-1,629
12	-1,315
13	-1,635
Total	–20,996

North Dakota	
Total	-1,037

Ohio	
1	-1,805
2	-1,812
3	-1,067
4	-2,937
5	-2,857
6	-1,747
7	-2,635
8	-2,561
9	-1,855
10	-1,502
11	-1,249
12	-1,558
13	-2,033
14	-2,505
15	-1,402
16	-2,221
Total	–31,747

Oklahoma	
1	-1,671
2	-1,537
3	-1,232
4	-1,070
5	-987
Total	–6,497

Oregon	
1	-2,487
2	-1,092
3	-1,528
4	-1,210
5	-1,324
Total	–7,643

Pennsylvania	
1	-819
2	-512
3	-2,036
4	-2,088
5	-1,933
6	-1,975
7	-1,593
8	-1,882
9	-1,593
10	-1,760
11	-1,602
12	-1,482
13	-1,316
14	-956
15	-1,979
16	-2,158
17	-1,761
18	-1,480
Total	–28,926

Rhode Island	
1	-1,147
2	-1,113
Total	–2,260

South Carolina	
1	-1,126
2	-1,249
3	-2,132
4	-2,099
5	-1,817
6	-1,127
7	-1,180
Total	–10,731

South Dakota	
Total	-1,622

Tennessee	
1	-1,880
2	-1,305
3	-1,823
4	-2,097
5	-1,066
6	-1,733
7	-1,561
8	-1,729
9	-966
Total	–14,159

Texas	
1	-1,316
2	-1,624
3	-1,530
4	-1,553
5	-1,099
6	-1,643
7	-1,349
8	-1,242
9	-977
10	-1,443
11	-986
12	-1,540
13	-1,270
14	-1,563
15	-624
16	-785
17	-1,261
18	-1,245
19	-735
20	-672
21	-873
22	-1,382
23	-685
24	-1,439
25	-1,159
26	-1,399
27	-1,049
28	-526
29	-1,465
30	-1,050
31	-1,199
32	-1,398
33	-1,555
34	-535
35	-846
36	-1,743
Total	–42,760

Utah	
1	-1,726
2	-1,130
3	-1,090
4	-1,486
Total	–5,431

Vermont	
Total	-1,378

Virginia	
1	-794
2	-1,042
3	-1,208
4	-1,345
5	-1,366
6	-1,602
7	-886
8	-398
9	-1,611
10	-756
11	-497
Total	–11,503

Washington	
1	-1,820
2	-1,801
3	-1,363
4	-959
5	-919
6	-967
7	-1,166
8	-1,631
9	-1,547
10	-903
Total	–13,077

West Virginia	
1	-991
2	-895
3	-581
Total	–2,467

Wisconsin	
1	-2,733
2	-1,847
3	-2,270
4	-1,717
5	-2,829
6	-3,489
7	-2,457
8	-3,080
Total	–20,421

Wyoming	
Total	-489

Note: Figures may not sum to totals due to rounding.
Source: Authors' calculations based on data from the Heritage Energy Model.