

Partial Impacts of Alternative CAIR-Plus EGU Controls on the Midwest Economy

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Objectives of this analysis

- Estimate a portion of the economic impacts of electric utility controls exceeding U.S. EPA's CAIR rule on the Midwest economy – output and jobs
- Calculate impacts relative to a base case of EPA's CAIR rule (requiring 70% reductions of electric utility sulfur dioxide and nitrogen oxide emissions by 2015)
- Develop impact estimates for regional coal mining and for 9 of the most energy intensive industries in the region
- Impact estimates derived from June 2005 analysis by Jim Marchetti of direct costs of meeting alternative EGU BACT limits in the “LADCO EGU White Paper”

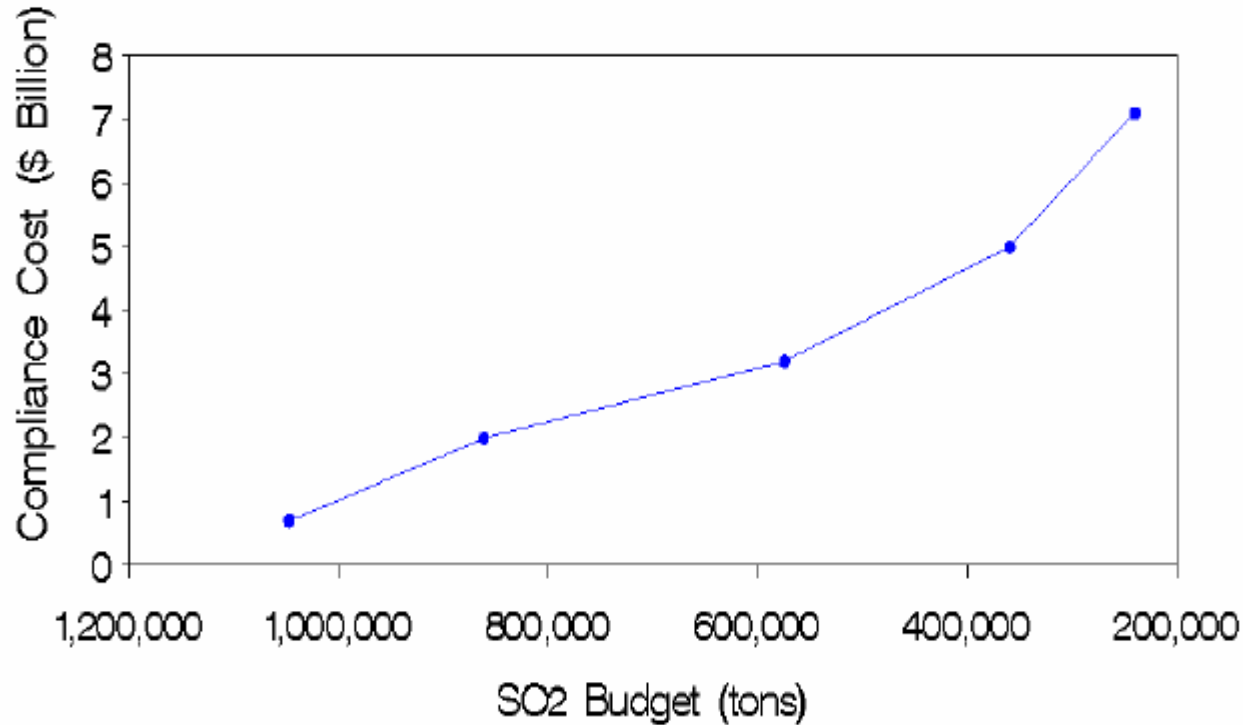
A note on assumptions

- LADCO's EGU White Paper incorporated STAPPA-recommended Best Available Control Technology (BACT) limits for existing ("EGU1") and new ("EGU2") generating units
- Marchetti's analysis applied these BACT emission limits to an historic 2000-2003 emissions baseline to estimate emission caps for SO₂ and NO_x
- The LADCO White Paper also developed intermediate levels of controls ("IM1" and "IM2")
- Our analysis treats the IM and EGU control levels as four alternative control scenarios
- The IM scenarios are assumed to apply in 2012, the EGU scenarios are assumed to apply in 2013
- LADCO is evaluating a future "grown" baseline that may reduce the stringency of caps associated with the STAPPA BACT emission rate limits

Summary range of impacts of alternative CAIR-Plus EGU controls compared to EPA's regulation (CAIR)

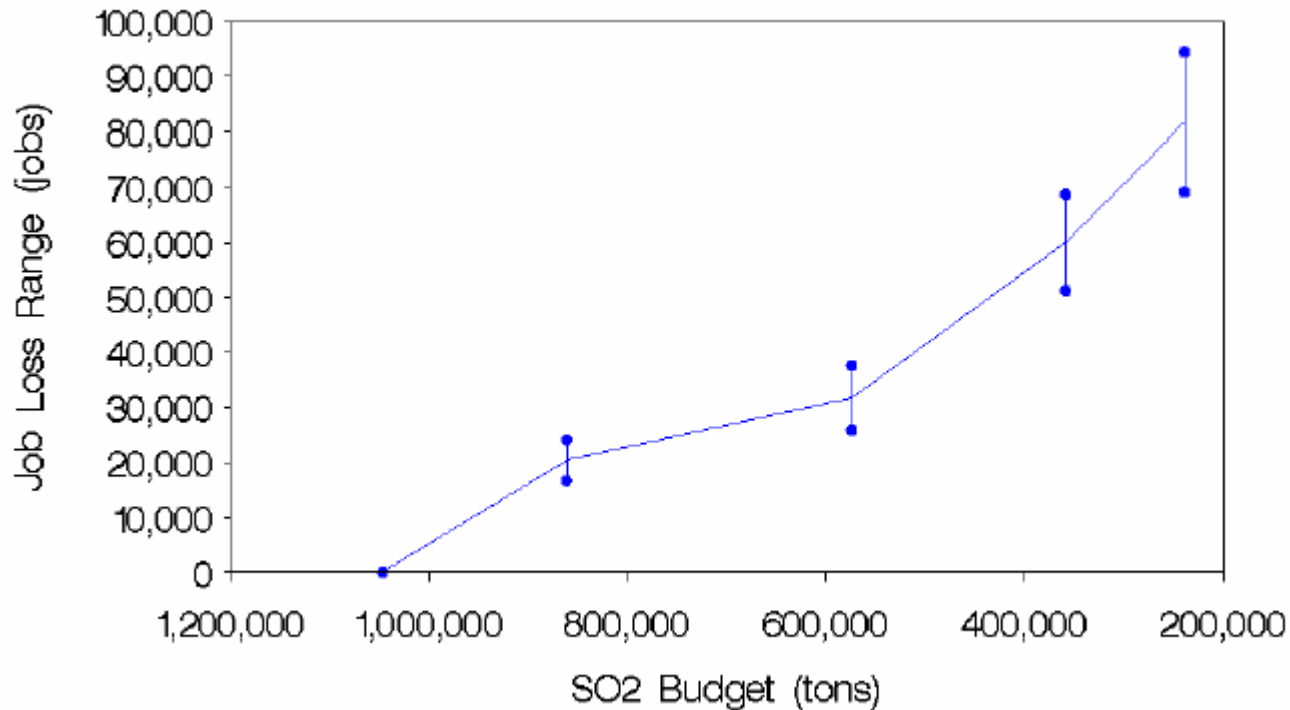
| | <u>IM1 (2012)</u> | <u>EGU2 With Power Replacement (2013)</u> |
|----------------------------------|-----------------------|---|
| Electric rate increases | 4.7% | 15.7% |
| Decreased annual output (\$2003) | \$1.9 – \$3.3 billion | \$9.0 – \$14.1 billion |
| Decrease in jobs | 17,000 – 24,000 | 69,000 – 94,000 |

Direct costs rise with tighter SO2 caps ... from CAIR to EGU2



Note: For simplicity, only SO2 cap levels are depicted on the x axis.

Job losses increase with tighter SO2 caps ... from CAIR to EGU2

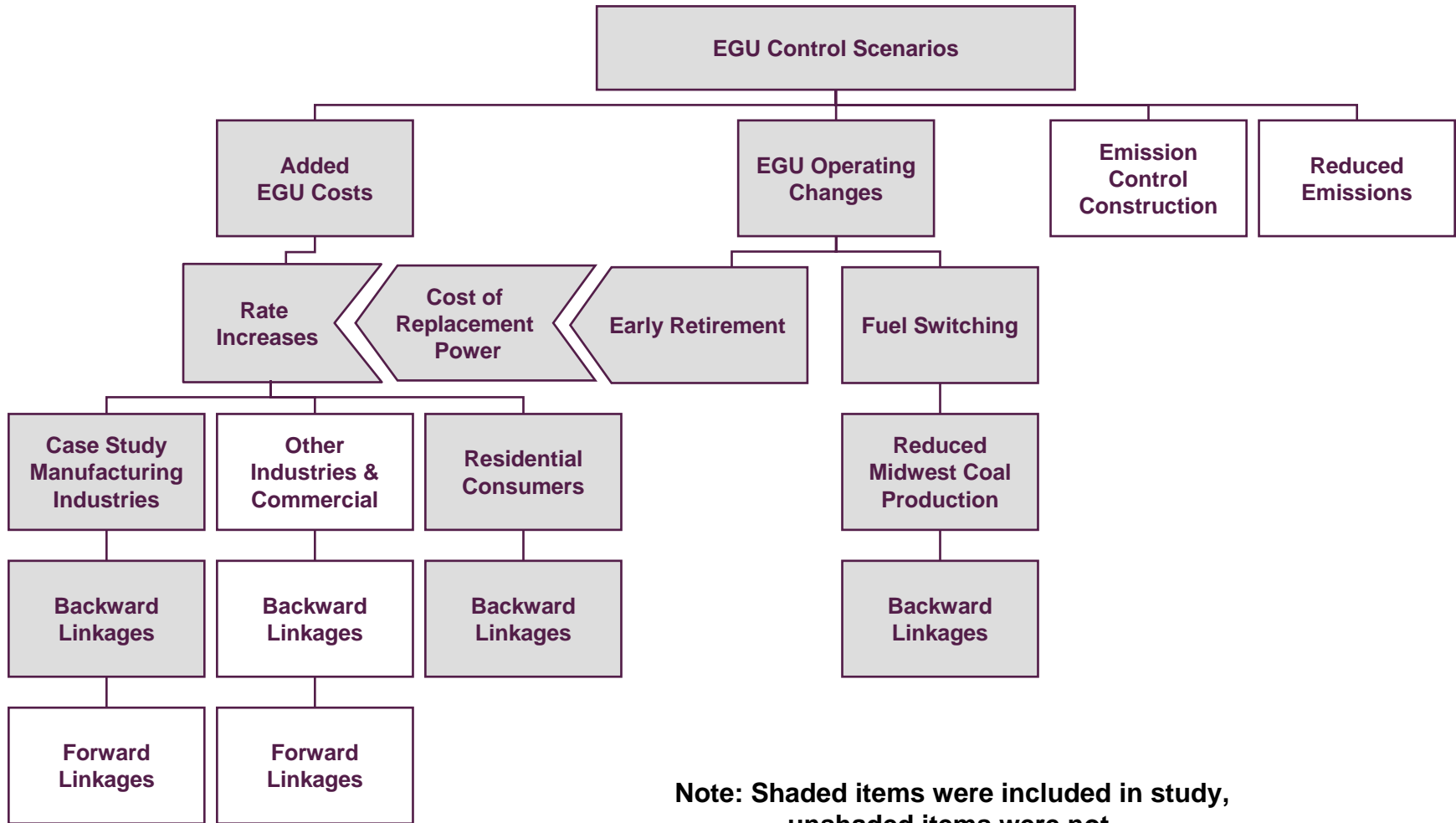


Note: For simplicity, only SO2 cap levels are depicted on the x axis.



Part 1:
Study Approach and Limitations

Factors included and not included in the economic study



Note: Shaded items were included in study, unshaded items were not.

Case study industries

| Case Study Industry | Value of Electricity Purchased (Millions) | Percent of Total Outlay | 2002 Employment | | | | | |
|--|---|-------------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| | | | Illinois | Indiana | Michigan | Ohio | Wisconsin | Region |
| Food Products | \$848 | 0.89% | 85,252 | 32,450 | 35,257 | 59,410 | 65,129 | 277,498 |
| Paper Mfg | \$680 | 1.90% | 27,110 | 12,144 | 15,750 | 27,578 | 42,971 | 125,553 |
| Chemical Mfg | \$1,034 | 1.13% | 52,476 | 30,569 | 30,185 | 47,751 | 13,611 | 174,592 |
| Plastics & Rubber Production | \$830 | 1.63% | 51,371 | 44,220 | 42,364 | 77,141 | 33,187 | 248,282 |
| Computer & Electronic Product Mfg | \$170 | 0.52% | 52,002 | 23,040 | 20,500 | 31,385 | 23,099 | 150,026 |
| Primary Metal Mfg | \$1,212 | 2.34% | 26,283 | 55,236 | 27,549 | 55,335 | 20,534 | 184,938 |
| Fabricated Metal Production | \$713 | 0.98% | 113,535 | 59,034 | 82,977 | 115,897 | 69,369 | 440,812 |
| Machinery Mfg | \$451 | 0.56% | 92,905 | 45,501 | 78,483 | 87,370 | 71,142 | 375,401 |
| Transportation Equipment | \$1,093 | 0.41% | 46,715 | 133,687 | 283,875 | 155,862 | 36,202 | 656,341 |
| Coal Mining | <u>\$36</u> | 1.48% | <u>3,976</u> | <u>3,041</u> | <u>0</u> | <u>2,584</u> | <u>0</u> | <u>9,601</u> |
| Total Case Study Industries | \$7,065 | | 551,625 | 438,922 | 616,940 | 660,313 | 375,244 | 2,643,044 |
| Total Industrial and Commercial | \$20,569 | | 7,289,097 | 3,555,638 | 5,490,824 | 6,670,712 | 3,355,531 | 26,361,802 |



Part 2:
Impacts on Midwest Electricity Rates

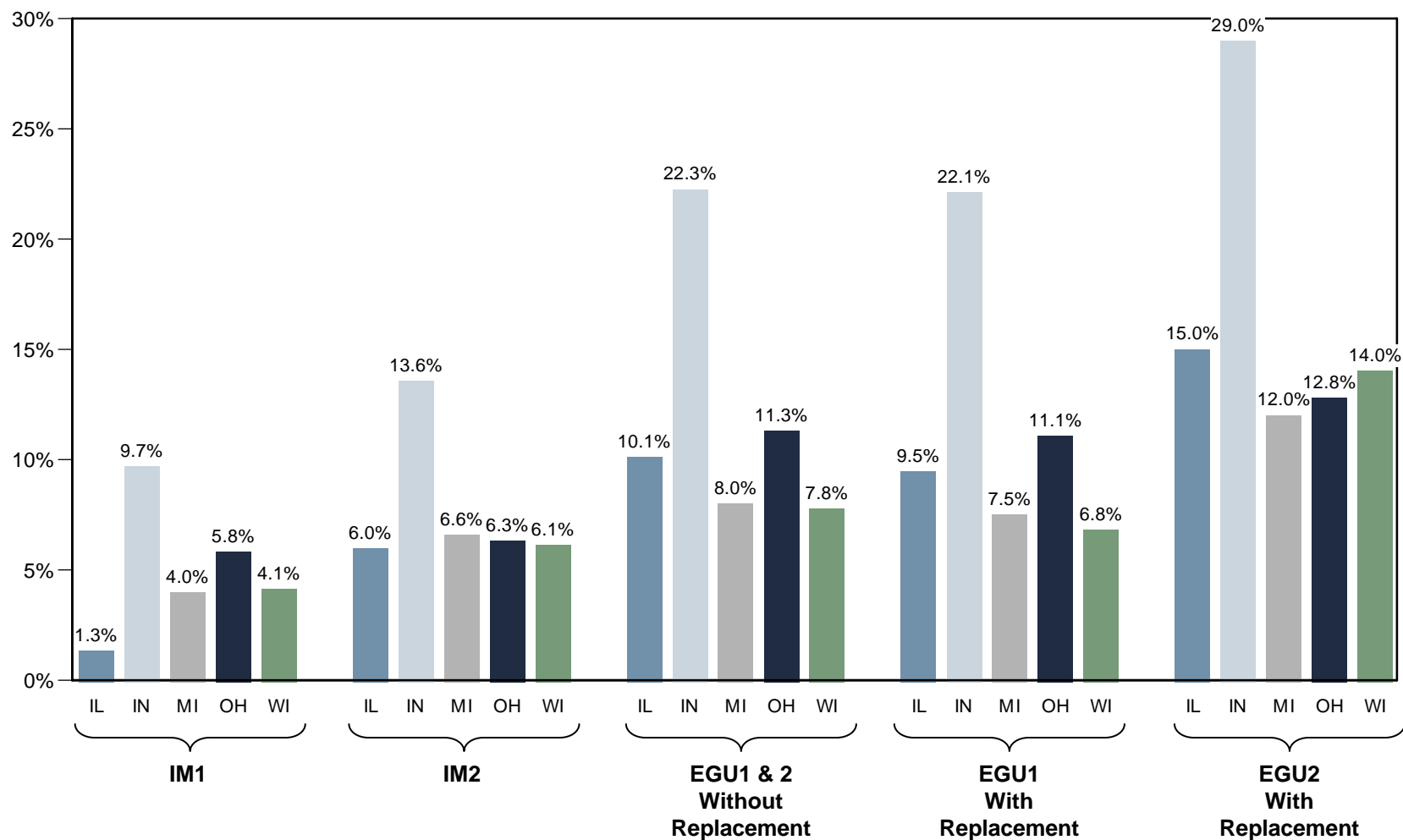
Projected annual direct costs of alternative CAIR-Plus EGU control measures (millions of 2003 dollars)

| State | 2012 | | 2013 | | |
|---------------|----------------|----------------|---------------------------|------------------------|----------------|
| | IM1 | IM2 | Without Replacement Power | With Replacement Power | |
| | | | EGU1/EGU2 | EGU1 | EGU2 |
| Illinois | \$ 142 | \$ 646 | \$1,118 | \$1,048 | \$1,660 |
| Indiana | 622 | 873 | 1,496 | 1,488 | 1,949 |
| Michigan | 353 | 584 | 740 | 696 | 1,112 |
| Ohio | 713 | 773 | 1,447 | 1,418 | 1,640 |
| Wisconsin | 204 | 303 | 393 | 345 | 711 |
| Region | \$2,035 | \$3,179 | \$5,194 | \$4,995 | \$7,073 |

Note: Totals may not add due to rounding.

Source: James Manchetti, Michael Hein and J. Edward Cichanowicz, 2005.

Impacts of alternative CAIR-Plus control measures on 2012 and 2013 electricity rates — percent change*



*Additional rate increases over and above increases needed to comply with CAIR Rule. IM1 and IM2 scenarios examined in 2012, EGU1 and EGU2 scenarios in 2013.

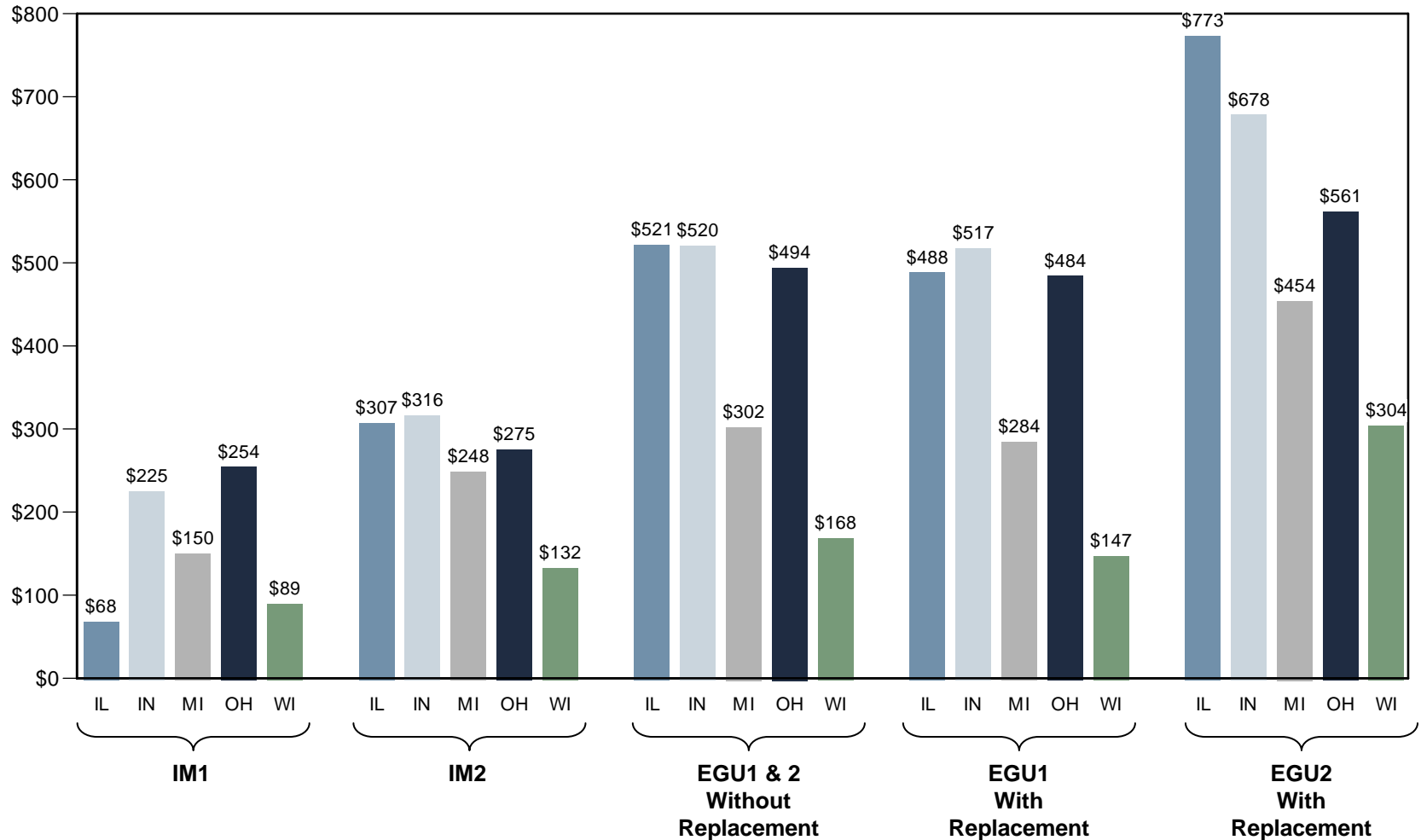
Effects of projected rate increases on affordability of industrial electric rates – EGU2

Affordability Ranking Among 50 States

| State | Current (2003) | With Projected EGU2 Rate Increase (2013) |
|--------------|-----------------------|---|
| Illinois | 29 | 38 |
| Indiana | 5 | 27 |
| Michigan | 31 | 35 |
| Ohio | 27 | 33 |
| Wisconsin | 24 | 32 |

Note: 1 = state with lowest rates and 50 = state with highest rates.

Additional annual electricity costs for residential customers under alternative CAIR-Plus EGU control measures* (millions of 2003 dollars)



*IM1 and IM2 scenarios examined in 2012, EGU1 and EGU2 scenarios in 2013.



Part 3:
**Combined Impacts on
Case Study Industries and Households**

Projected annual decrease in Midwest regional output under alternative CAIR-Plus EGU control measures (millions of 2003 dollars)

| | 2012 | | 2013 | | |
|-----------------------|-------------------------|-------------------------|---------------------------|--------------------------|--------------------------|
| | IM1 | IM2 | Without Replacement Power | With Replacement Power | |
| | | | EGU1/EGU2 | EGU1 | EGU2 |
| Case Study Industries | \$440 –\$1,340 | \$660 –\$2,090 | \$2,400 –\$4,670 | \$2,360 –\$4,530 | \$2,960 – \$6,070 |
| Secondary Impacts | \$260 – \$830 | \$400 –\$1,300 | \$1,760 –\$3,180 | \$1,730 –\$3,090 | \$2,130 – \$4,080 |
| Residential Impacts | \$1,160 | \$1,820 | \$2,870 | \$2,760 | \$3,910 |
| Total | \$1,860 –\$3,330 | \$2,880 –\$5,210 | \$7,030 –\$10,710 | \$6,850 –\$10,380 | \$9,000 –\$14,060 |

Projected decreases in regional employment under alternative CAIR-Plus EGU control measures

| | 2012 | | 2013 | | |
|-----------------------|-----------------------|-----------------------|---------------------------|-----------------------|------------------------|
| | | | Without Replacement Power | | With Replacement Power |
| | IM1 | IM2 | EGU1/EGU2 | EGU1 | EGU2 |
| Case Study Industries | 1,130 – 3,680 | 1,700 – 5,750 | 6,590 –12,850 | 6,490 –12,490 | 8,080 –16,680 |
| Secondary Impacts | 2,190 – 7,060 | 3,290 –11,060 | 13,270 –25,300 | 13,060 –24,610 | 16,190 –32,730 |
| Residential Impacts | 13,400 | 20,940 | 33,050 | 31,790 | 45,060 |
| Total | 16,720 –24,140 | 25,930 –37,750 | 52,910 –71,200 | 51,340 –68,890 | 69,330 –94,460 |

Projected decreases in state employment under alternative CAIR-Plus EGU control measures

| | 2012 | | 2013 | | |
|--------------|------------------------|------------------------|---------------------------|------------------------|------------------------|
| | | | Without Replacement Power | | With Replacement Power |
| | IM1 | IM2 | EGU1/EGU2 | EGU1 | EGU2 |
| Illinois | 1,020 – 1,370 | 4,660 – 6,350 | 9,300 – 12,110 | 8,800 – 11,410 | 13,400 – 17,610 |
| Indiana | 5,380 – 8,180 | 7,590 – 11,730 | 17,680 – 24,330 | 17,510 – 24,150 | 22,280 – 31,140 |
| Michigan | 3,270 – 4,520 | 5,440 – 7,660 | 6,630 – 9,290 | 6,270 – 8,730 | 10,050 – 14,090 |
| Ohio | 5,510 – 7,800 | 5,960 – 8,600 | 16,410 – 21,120 | 16,190 – 20,780 | 18,300 – 23,660 |
| Wisconsin | 1,540 – 2,280 | 2,280 – 3,420 | 2,870 – 4,330 | 2,560 – 3,830 | 5,290 – 7,950 |
| Total | 16,720 – 24,140 | 25,930 – 37,750 | 52,910 – 71,200 | 51,340 – 68,890 | 69,330 – 94,460 |