GREAT LAKES REGIONAL POLLUTION PREVENTION ROUNDTABLE

GLRPPR

Spotlight on Indiana's Manufacturing Sector

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Introduction

In 2015, the Great Lakes Regional Pollution Prevention Roundtable (GLRPPR) began a project to analyze data from U.S. EPA's Toxics Release Inventory (TRI) and Greenhouse Gas databases and the Census Bureau's County Business Patterns Database to determine the impact of manufacturing on the economy and environment of the six states in U.S. EPA Region 5. This fact sheet summarizes findings for Indiana's manufacturing sector (NAICS 311-337).

Economy and TRI Emissions

Indiana's fabricated metal products sector had the most establishments (U.S. Bureau of the Census, 2015). The transportation equipment manufacturing sector had the highest payroll.

The primary metals industry accounted for the most TRI emissions. It ranks second in payroll size, third in number of employees, and eleventh in number of establishments. The chemical manufacturing industry accounts for the second highest emissions. It ranks seventh in payroll size, eighth in number of employees, and tenth in number of establishments. These data suggest that both of these manufacturing sectors consist of fewer, larger facilities that have a greater impact on emissions than sectors with a greater number of relatively smaller facilities. **Figure 1** compares the significance of chemical emissions and the economic impact of specific industry sectors.

2015 Data Summary

Number of TRI Entries: 2,819
Number of TRI Facilities: 819 (based on TRI ID)
Number of GHG Facilities: 105
Number of P2 Entries (TRI): 247
Number of P2 Entries Reporting Reductions: 105
Total CO_{2e} Releases: 53,857,140 metric tons
Total On and Off-Site Releases: 99,989,368 lbs.
Chemical Emissions Rank: 1st of 6 Great Lakes states

Releases

	Total	Highest Emitter
Air	21,060,166 lbs.	Primary metals
Land	21,640,044 lbs.	Primary metals
Water	17,205,098 lbs.	Primary metals
Off-site	39,422,772 lbs.	Primary metals
CO_{2e}	53,857,140 metric tons	Primary metals

Top Five Industry Sector Emitters

TRI	GHG
1. Primary metals	1. Primary metals
2. Chemicals	2. Petroleum
3. Plastics & rubber	3. Chemicals
4. Transportation equipment	4. Nonmetallic minerals
5. Food	5. Food

Top Five Chemical Releases

1. Zinc compounds
2. Nitrate compounds
3. Manganese compounds
4. Lead compounds
5. Styrene

Indiana is the Top Emitter in:

TRI	GHG
1. Primary metals	1. Primary metals
2. Printing	
3. Furniture	

Sectors with the Greatest Emissions Reductions (in pounds)

1. Primary metals
2. Chemicals
3. Plastics & rubber
4. Transportation equipment
5. Fabricated metals

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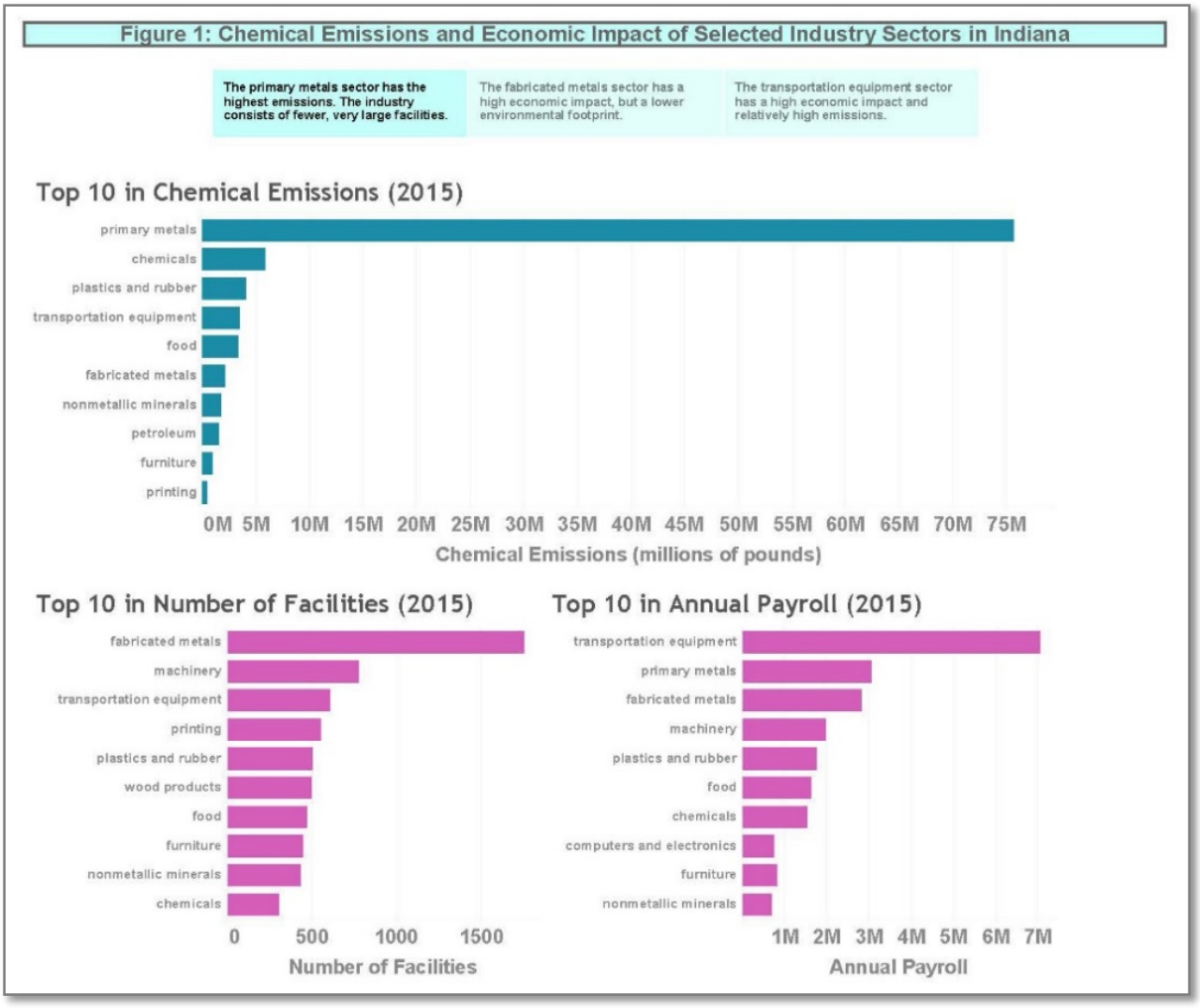
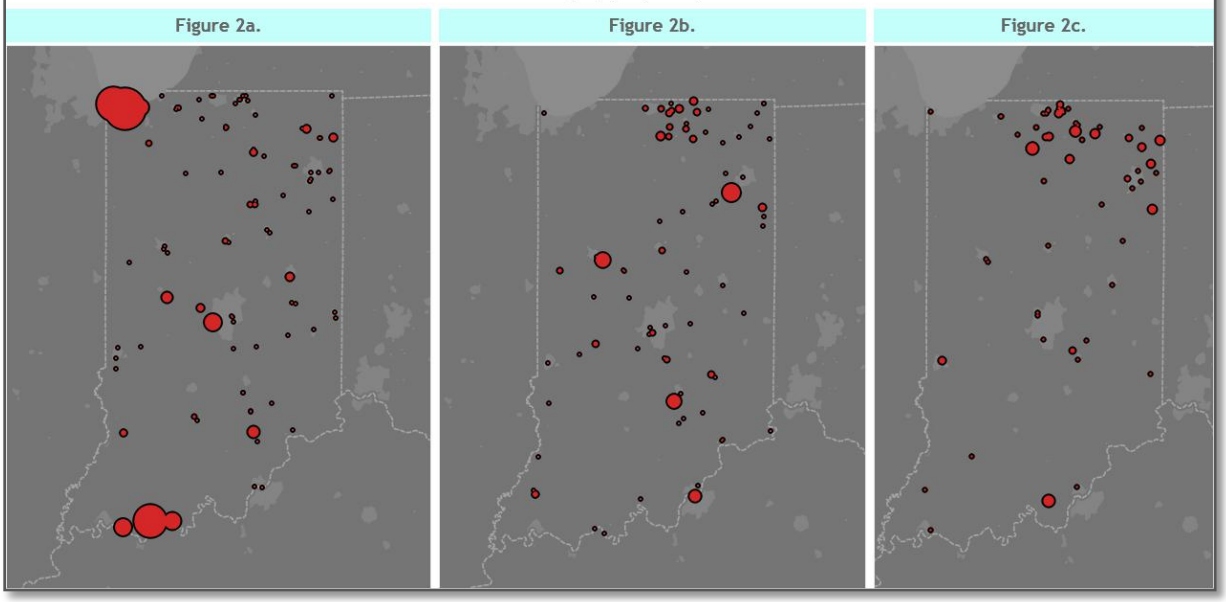
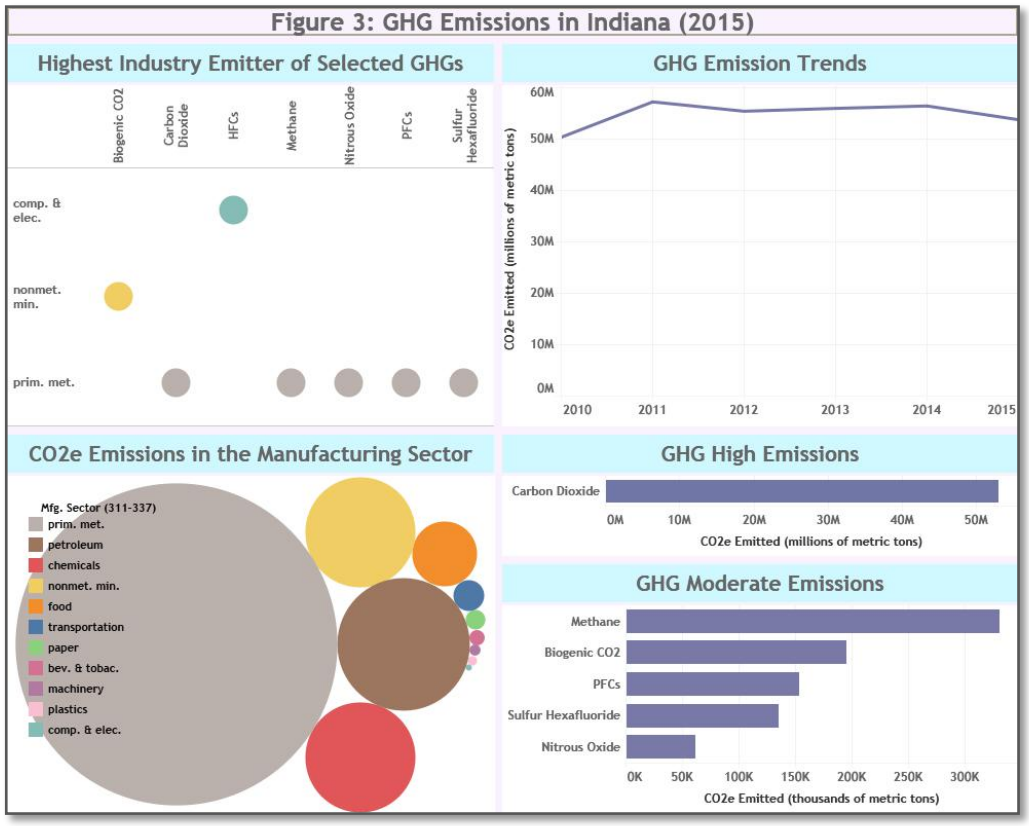


Figures 2a, 2b, and 2c show the distribution of cities and towns containing primary metal facilities (a), transportation manufacturing facilities (b), and plastics and rubber manufacturing facilities (c) with TRI chemical releases (greater than 0 pounds) in Indiana in 2015. Circle sizes indicate the relative amount of the releases in pounds for the corresponding sector. Circles may represent more than one facility in that geographic location. Locational patterns can be easily identified. For example, plastics and rubber facilities tend to be clustered in the northeast part of Indiana, and transportation equipment manufacturers appear to be more scattered throughout the state. Finally, primary metal facilities with larger releases are found in the northwest and southwest corners of the state, and facilities with smaller amounts are more evenly distributed throughout Indiana.

Figure 2: Distribution of Indiana Facilities in the Primary Metals sector (2a), the Transportation sector (2b), and the Plastics and Rubber sector (2c) (TRI, 2015).



Greenhouse Gas (GHG) Emissions



In 2015, Indiana ranked first of the six Region 5 states in overall GHG emissions. Every state reported decreased GHG emissions from 2014 to 2015. Indiana was no exception. Companies in the state reported a decrease of approximately 2,679,314 metric tons.

The top five GHG emitters in Indiana's manufacturing sector in 2015 were the primary metals, petroleum, chemicals, nonmetallic minerals, and food manufacturing industries. Indiana was the highest GHG emitter of all Region 5 states in the primary metals industrial sector.

The primary metals industry (NAICS 331) was the highest emitter of nitrous oxide, sulfur hexafluoride, PFCs, methane, and carbon dioxide (carbon dioxide composes the bulk of all GHG emissions in the state). The nonmetallic minerals industry (NAICS 327) was the highest emitter of biogenic CO_2, and the computer and electronic product manufacturing industry (NAICS 334) reported the highest amounts of hydrofluorocarbon (HFC) emissions. **Figure 3** shows several different visualizations of Indiana's greenhouse gas emissions data.

Pollution Prevention (P2) Practices

The TRI reporting program includes an optional reporting section where companies can report which pollution prevention practices they used to reduce specific chemicals. Facilities report the activity implemented and the method by which this P2 opportunity was identified using designated codes (W and T codes). Facilities can also choose to describe these activities or other measures taken to reduce toxic chemical releases using a free-text data entry field on the TRI reporting form. Under the Pollution Prevention Act, TRI facilities report a production or activity ratio that typically compares production in the current year with that of the prior year. For a chemical used in the generation of electricity, for example, the production ratio for that chemical reflects the annual change in number of kilowatt hours produced. Using this ratio, year-to-year changes in waste management quantities can be viewed within the context of production, which can help gauge whether reductions were the result of reported source reduction activities (EPA, 2016). The normalized data are available only in the P2 Details Reports included with EPA's online P2 data tool. Except where noted, the discussion of P2 practices in this fact sheet is based on actual reported releases and reductions, rather than the values normalized for production.

Based on the TRI P2 data entries from facilities with reported reductions, good operating practices (W13 through W19) and raw material modifications (W41 through W49) were the most effective P2 practices or practice combinations. Spill and leak prevention (W31-W39) was the third most commonly reported source reduction category. According to Ranson et al. (2015), the pollution prevention technique that most effectively reduces emissions is raw material modifications. The most common raw material modifications reported by Indiana companies were "substitution of raw materials" (W42) and "increased purity of raw materials" (W41). Facilities also reported specific good operating practices, such as "improved maintenance scheduling, recordkeeping, or procedures" (W13). Several companies reported using process modifications, such as "modified equipment layout or piping" (W52) and "optimized reaction conditions or otherwise increasing the efficiency of their process" (W50). Those facilities reporting spill and leak prevention mentioned "improved procedures for loading, unloading, and transfer operations" (W32) and "implemented inspection or monitoring programs" (W36).

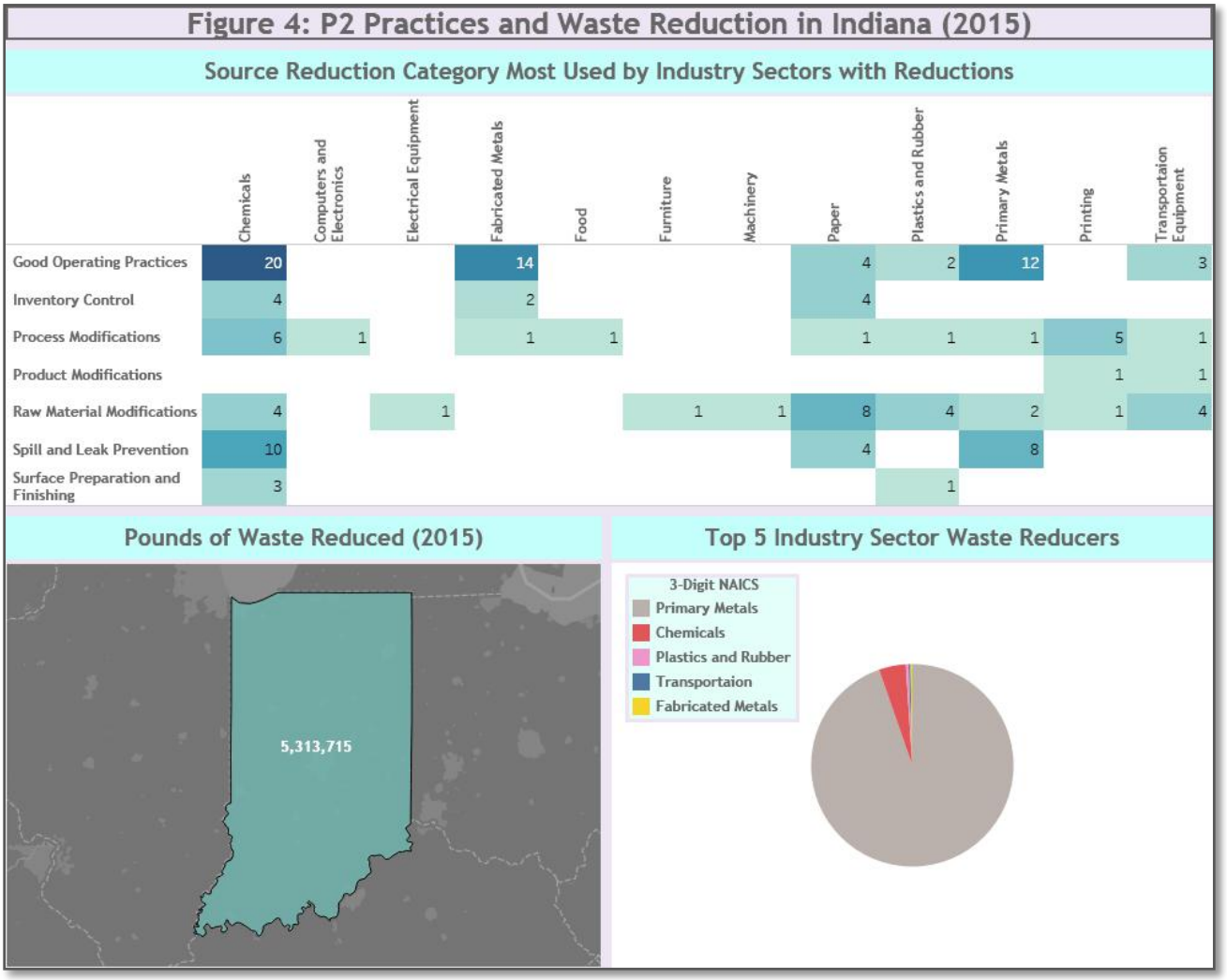
Of the six states in the region, Indiana was first in the most pounds of toxic emissions reduced (over five million pounds). As illustrated in **Figure 4**, the industrial sectors that led the manufacturing sector in reductions were primary metals, chemicals, plastics and rubber, transportation equipment, and

The primary metal industry subsectors that reduced their emissions the most from 2014 to 2015 were:

- Iron and steel mills and ferroalloy manufacturers (NAICS 331110)
- Other nonferrous metal foundries (except die-casting) (NAICS 331529)

fabricated metals. Four of these sectors (primary metals, chemicals, plastics and rubber, and transportation equipment manufacturing) also ranked in the top five waste emitters in Indiana. The fifth highest emitter was the food processing industry.

The top five chemicals reduced were zinc, manganese, lead, and copper compounds, and toluene. Reductions of zinc compounds topped four million pounds. The next highest reduction was manganese compounds at a little over 442,000 pounds. All but one of the chemicals with the highest reductions in Indiana were heavy metals, which correlates with the fact that the primary metals industry reported the most reductions in 2015.



The most notable trend in Indiana's 2015 P2 data is the large gap between the waste reduced by primary metal companies compared with the combined reductions of the rest of the state's manufacturing sectors, as shown by the pie chart on the bottom right of **Figure 4**. Primary metal facilities reduced 5,014,633 pounds of emissions, which makes up about 94% of the total reductions reported statewide. The next highest number of pounds reduced was 227,986 pounds in the chemical industry. All other industry sectors reported reducing less than 25,000 pounds, with seven sectors reporting reductions of less than 10,000 pounds.

One engineered steel bar mill decreased their zinc compound emissions so substantially that the company accounted for almost all of the primary metal sector's total emission reductions. The facility reported using "improved maintenance scheduling, recordkeeping, or procedures" (W13) and "improved procedures for loading, unloading, and transfer operations" (W32). They did not add additional comments to describe what those modifications were. They have reported the same practices every year since 2009 with no additional comments. They also reported that their amount of production-related waste (zinc compounds) decreased by almost 700,000 pounds from 2014 to 2015. When waste quantities of zinc compounds were normalized relative to production at this company, the number of pounds reduced was lower, but still significant. However, the company reported in 2015 that they started recycling most of their waste (zinc compounds) offsite instead of releasing it. In 2014, the company reported recycling only a small portion of their waste offsite (about 0.03%). In 2015, they reported recycling over 3.5 million pounds, which is about 88% of their production-related waste. Thus, a large proportion of the reductions reported by this company occurred because they changed their waste management practices, rather than changing their practices to reduce the amount of production waste they generated.

One non-ferrous metal foundry decreased emissions of zinc compounds by nearly 27% by "introducing an in-line product quality monitoring or other process analysis system" (W15). They reported that 67% of their foundry sand now tested non-hazardous, allowing for disposal at a local landfill. They are now trying to identify beneficial reuse projects for their foundry sand. When their waste quantities of zinc compounds were normalized relative to production, the number of pounds reduced amounted to an emissions decrease of about 7%.

The chemical manufacturing industry reported the second highest emission reductions in 2015. The sector decreased overall emissions by 227,986 pounds. One adhesive manufacturing company accounted for 32% of the total emission reductions in this sector, primarily through reduced toluene emissions. They reported using "other changes in operating practices" (W19) and "improved procedures for loading, unloading, and transfer operations" (W32) to achieve these reductions. This was the first year that the company reported P2 practices, and they provided no additional details. They also reported that their amount of production-related waste (toluene) decreased by almost 300,000 pounds from 2014 to 2015. When toluene waste quantities were normalized relative to production, the number of pounds reduced was slightly lower, but still significant. Again, what appears to have changed in 2015 is waste management practices for toluene. A much larger portion of production-related toluene waste was treated onsite in 2015 than in any year from 2009 to 2014.

Finally, the furniture manufacturing industry showed an almost 92% emissions reduction, the highest percent change from 2014 to 2015, even though only one company in the sector reported a release reduction in 2015. This wood kitchen cabinet and countertop manufacturing facility reported "substituting raw materials" (W42) to reduce releases of N-butyl alcohol by about 8,300 pounds. The company stated that they initiated a program to eliminate the use of one of its cleaning solvents, which contributed to most of its use of N-butyl alcohol. The facility also transitioned its coating formulations to products that did not contain this chemical. However, when looking at N-butyl alcohol waste quantities normalized relative to production, they no longer showed any emission reductions.

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For More Information

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