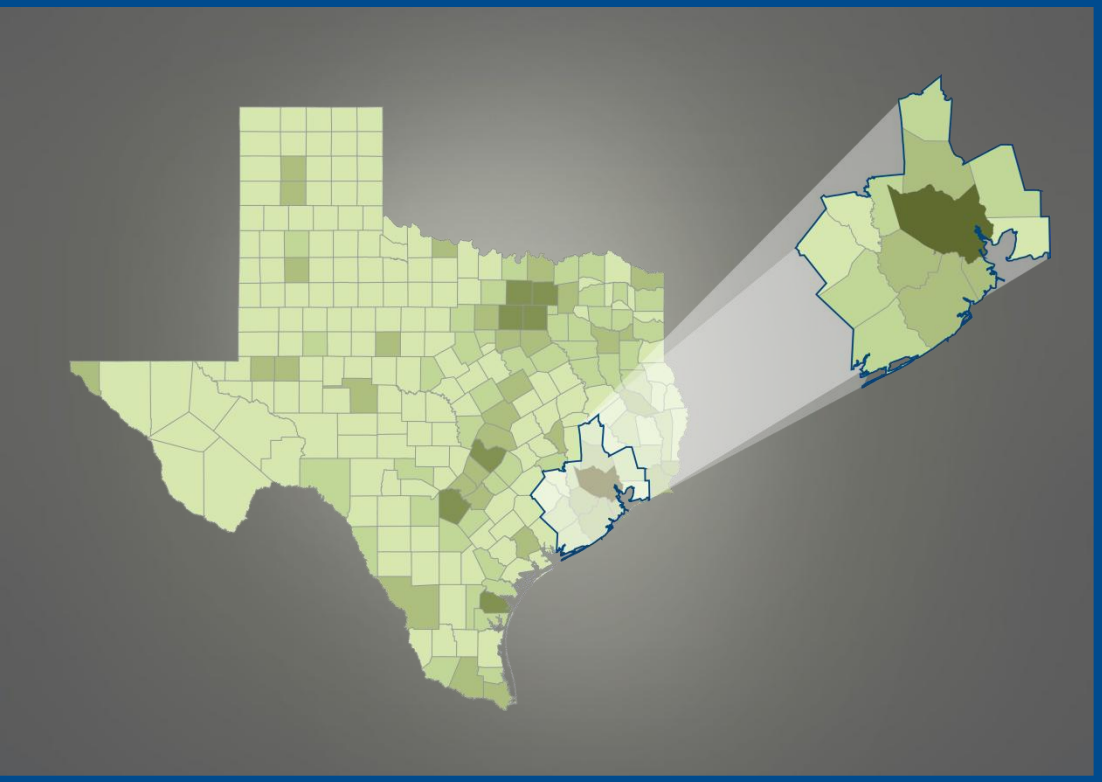

Report on the Economic Impact of Recycling in the H-GAC Region

Houston-Galveston Area Council

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SAIC Energy, Environment & Infrastructure LLC
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Agenda

- Introductions
- Background
  - Purpose and Scope
  - Industry Categories and Business Types Considered
  - Overview of Methodology
- Results Part I: Estimated Economic Activity Today
- Results Part II: Projected Economic Activity with Increased Recycling
- Open Discussion
  - What do the results mean to my community?
  - What kind of recycling businesses should be nurtured and grown?
  - How do I convince decision makers to invest in recycling?
  - How can I use this tool to determine the impact of other investments in the region?
- Next Steps

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Purpose

- Encourage investment in recycling in the 13 counties of the H-GAC Region
- Target specific types of recycling and/or reuse businesses to be nurtured and grown due to their impact potential on the regional economy
- Make the Houston-Galveston area more sustainable
  - View discards as resources not waste
  - Move toward sustainable resource management

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Scope

- Identify boundaries of analysis (in versus out)
- Identify establishments within each business type
- Estimate jobs, payroll, and gross receipts associated with these establishments
- Develop baseline for economic contribution of existing recycling industry in the region
- Propose and select potential scenarios to increase contribution of recycling industry in the region in the future
- Model economic contribution of selected scenarios in region
- Prepare findings and recommendations

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Recycling Industry: Categories Considered

1. Recycling Industries (Supply Side)
   - Collect and process recovered materials into feedstock for Recycling Reliant Industries
2. Recycling Reliant Industries (Demand Side)
   - Consumers of recycled material
   - May use combination of virgin and recycled raw materials to manufacture new product
3. Reuse and Remanufacturing Industries
   - Refurbish, repair, or retail recovered material
4. Energy Recovery (and Beneficial Reuse)
   - Conversion of recovered material to fuel/energy

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Business Types: Recycling Industries (Supply Side)

	Category	Description
1	Residential collectors	Collect recyclables from single or multi-family residences, includes drop-off centers and HHW collection points
2	Non-residential collectors	Collect recyclables from industrial, commercial, and institutional facilities; includes waste tire and used oil collection points
3	Compost/organics processors	Process organic materials including yard waste, biosolids, etc. to produce mulch, soil amendments, etc.
4	Recyclable material wholesalers	Paper stock dealers, scrap metal processors, tire processors, and other establishments that minimally sort, remove contaminants, and densify recovered materials
5	Materials recovery facilities	Process mixed recovered materials by sorting, crushing, and screening
6	Construction and demolition debris recyclers	Sort, crush, grind, screen construction and demolition debris
7	Electronics processors	Dismantle, crush, shred and separate electronics components and materials
8	Nonferrous secondary smelting and refining mills	Recycle alloy and nonferrous metals from scrap, primarily producing billets, ingots, or other basic intermediates
9	Plastics reclaimers	Transform recovered plastics directly into products (e.g. plastic lumber) or raw materials ready for remanufacture (flake/pellet)

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Business Types: Recycling Reliant Industries (Demand Side)

	Category	Description
10	Glass product producers	Produce non-container products from recycled glass (e.g., fiberglass, plate glass)
11	Iron and steel foundries	Produce cast iron/steel products
12	Nonferrous foundries	Produce castings of nonferrous metals
13	Nonferrous product producers	Produce nonferrrous formed products in integrated mills that also smelt/refine
14	Paper-based product manufacturers	Produce cellulose-based products from recovered paper/paperboard, including cellulose insulation, molded fiber products, hydro-seed, animal bedding
15	Pavement mix producers	Produce asphalt paving mix from recycled crumb rubber, recycled aggregates, recycled glass, or portland cement concrete from fly ash
16	Plastic product manufacturers	Companies that convert a recycled plastic clean flake or pellet into an intermediate or end product
17	Rubber product manufacturers	Produce products using ground rubber or cut rubber shapes/stampings as feedstock
18	Other recycling processors/manufacturers	Other processors or manufacturers not elsewhere classified; includes wallboard manufacturers recycling synthetic gypsum from power plants, and glass beneficiaries

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Business Types: Reuse and Remanufacturing Industries

	Category	Description
19	Electronics refurbishers	Remanufacture used electronic appliances, sort, grade, dismantle, and/or rebuild
20	Motor vehicle parts (used) establishments	Clean, sort, inspect, and remanufacture used parts
21	Tire retreaders	Remove old tread from tires (buffings and crumb rubber) and add new rubber tread
22	Wood reuse establishments	Process used wood for reuse, includes pallet rebuilders, flooring, etc.
23	Miscellaneous used merchandise sales (retailers)	Retail thrift stores, antique shops, reuse centers, shops dedicated to reused products
24	Other reuse establishments	Clean, grade, recondition, rebuild recovered materials not included elsewhere, including toner cartridges, industrial equipment remanufacturing, drums/intermediate bulk containers, etc.

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Business Type: Energy Recovery

	Category	Description
25	Energy recovery	Produce a processed fuel product from diverted waste or combust such materials for energy including pellet fuel producers, cement kilns, biomass energy facilities, biodiesel companies, used oil fuel blenders

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Overview of Methodology

- Estimate for each business type
  - Number of establishments
  - Total employees
  - Payroll
  - Receipts
  - Percent of activity attributable to recycling

- Sources of information
  - U.S. Census Bureau for business types consistent with NAICS code (6 business types)
  - Surveys of identified establishments (approximately 500 surveys sent, 120 responses)
  - Online research
  - Interviews with industry experts

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Overview of Methodology (cont')

- Develop input-output economic model – IMPLAN®
  - Use U.S. Department of Commerce data for the 13 Houston-Galveston Area Council counties
  - Isolate recycling and reuse industries and relationships
- Use model to characterize economic contribution of current recycling industry to region
- Define potential changes to recycling activity in region
- Use model to characterize economic contribution of recycling industry under three scenarios

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Definitions

- *Jobs* - the number of full- and part-time positions
- *Labor income* - wages and salaries of employees and proprietors, normal profits to sole proprietors, and an estimate of the cash value of all benefits (e.g., social security, unemployment, retirement, and medical benefits)
- *Value added* - gross regional product; includes “labor income” plus property incomes (dividends, interests, and rents), and indirect tax payments (primarily excise and sales taxes paid by individuals to businesses)
- *Total industrial output* - for most private industries is equivalent to gross sales and includes “value added”

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Definitions

- *Direct effects* are associated with the establishments identified as being within the “recycling industry”
- *Indirect effects* are associated with the establishments that provide goods or services to the establishments within the recycling industry
- *Induced effects* are associated with the establishments where employees of these establishments buy goods and services
- Only these effects *in the region* are considered

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Results Part I: Estimated Economic Activity Today

Estimated Economic Activity Today: Recycling Industries (Supply Side)

	Direct	Indirect	Induced	Total
Jobs	5,186	5,873	3,772	14,831
Labor Income (millions)	$332.4	$367.8	$178 .2	$878.4
Value Added (millions)	$734.4	$572.4	$328.5	$1,635.3
Industrial Output (millions)	$1,900.4	$911.9	$513.5	$3,325.9

Recyclable material wholesalers business type comprised over half of these jobs and industrial output

- Includes paper stock dealers, scrap metal processors, and other establishments that sort, remove contaminants, and densify primarily non-residential recovered materials (includes auto wreckers, carpet/textile processors, and tire/rubber processors)
- Relatively high multipliers, meaning a direct job or dollar of output has a relatively high indirect and induced economic effect

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Estimated Economic Activity Today: Recycling-Reliant Industries (Demand Side)

	Direct	Indirect	Induced	Total
Jobs	744	651	540	1,935
Labor Income (millions)	$45.9	$54.0	$26.1	$126.0
Value Added (millions)	$114.3	$85.0	$47.9	$247.3
Industrial Output (millions)	$328.0	$143.6	$74.1	$545.7

Iron and steel foundries, pavement mix manufacturers, and other recycling manufacturers account for approximately three quarters of the economic activity resulting from the recycling reliant industries (demand supply) in the region

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Estimated Economic Activity Today: Reuse and Remanufacturing Industries

	Direct	Indirect	Induced	Total
Jobs	3,704	436	645	4,784
Labor Income (millions)	$96.6	$26.8	$31.2	$154.6
Value Added (millions)	$138.0	$43.2	$57.3	$238.5
Industrial Output (millions)	$229.7	$69.3	$88.9	$387.9

Most of these jobs are in retail used merchandise sales

Estimated Economic Activity Today: Energy Recovery Industries

	Direct	Indirect	Induced	Total
Jobs	625	1,477	1,225	3,327
Labor Income (millions)	$88.2	$137.9	$59.0	$285.1
Value Added (millions)	$301.2	$223.0	$108.4	$632.5
Industrial Output (millions)	$977.8	$442.0	$167.4	$1,587.0

As a result of the higher paying jobs and relatively local feedstock to the energy recovery companies in the region, (the majority of which are bio-diesel companies), a direct job in energy recovery has far-reaching economic affects in the region

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Results Part II: Projected Economic Activity with Increased Recycling

Scenarios Considered and Selected

- Expand smelting/refining for nonferrous metal
- Expand policies and infrastructure for electronics diversion
- Increase use of Recycled Asphalt Pavement (RAP) and Recycled Shingle Pavement (RAS)
- Increase disposal fees at regional landfills
- Develop markets for tire-derived products
- Expand organics collection and processing
- Develop markets for using wood for boiler fuel
- Increase collection and processing of aggregates
- Expand plastic recycling and develop regional market for plastics
- Increase collection and processing of glass
- Increase infrastructure and use for biofuel
- Address regulatory hurdles to food waste composting

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Scenario 1: Increased Recovery of Electronics

- Current state requirements for manufacturers to develop infrastructure to recover electronics is extended to other electronic products
- Electronics are banned from landfill disposal
- Access to collection of electronics is expanded
- All electronics processors are required to be certified

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Scenario 1: Current and Projected Tons of Electronics Recovered in H-GAC Region

		Current	Additional	Total Scenario 1
Refurbished		1,176	744	1,921
Recycled	Computers	885	560	1,445
	Displays	1,022	647	1,669
	Hard Copiers	511	323	834
	Keyboard/Mice	34	22	56
	TVs	953	603	1,557
	Mobile Devices	12	7	19
Subtotal Recycled		3,417	2,162	5,579
TOTAL		4,593	2,906	7,500

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Scenario 1: Projected Increase in Jobs

- *Residential collectors:* 10 additional jobs to collect the additional electronics generated by the residential sector, primarily at drop-off locations
- *Non-residential collectors*: 10 additional jobs to collect the additional electronics generated by the commercial sector
- *Electronics processors*: 131 additional jobs to process 2,162 additional tons of electronics (based on the current estimate of 16.5 tons processed per job per year)
- *Electronics refurbishers*: 30 additional to refurbish 744 additional tons of electronics (at an estimated rate of 25 tons per person per year)
- *Other business types*: Although additional ferrous, nonferrous, plastic, glass, and other material is likely to be generated for recycling, no additional jobs within other business types are projected within the region

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Scenario 1: Projected Additional Economic Activity in the H-GAC Region (Direct, Indirect, Induced)

	Recycling Industries (Supply-Side)	Reuse and Remanufacturing
Jobs	216	49
Labor Income (millions)	$8.4	$2.2
Value Added (millions)	$12.7	$3.5
Industrial Output (millions)	$20.6	$5.9

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Scenario 2: Increased Use of Recycled Asphalt Pavement (RAP) and Recycled Asphalt Shingles (RAS), Increased Processing of Shingles and Brick at Construction Sites

- Adopt and implement current State specifications allowing expanded use of RAP and RAS in hot mix asphalt
- Promote, encourage, and incentivize the application of updated specifications
- Develop collection and processing infrastructure for RAS and RAP that meet demand and end use requirements
- Promote, encourage, incentivize on-site use of recovered bricks at construction sites for “flatwork”

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Scenario 2: Current and Projected Recovery in H-GAC Region

	Current Tons (1)	Additional Tons (2)
RAP	63,000	139,000
RAS	2,700	47,800
Shingles to be Processed	N/A	1,894 (3)
Bricks to be Processed	N/A	23,355 (4)

(1) Based on 10% of State estimate

(2) Assuming half of the roads in the region will contain 20 percent RAP and five percent RAS

(3) If shingles were diverted at 20 percent of new residential construction sites

(4) If bricks were diverted from 20 percent of new residential construction sites

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Scenario 2: Projected Increase in Jobs

- *Construction and demolition debris recyclers*: 15 new jobs to process additional shingles and bricks at new residential construction sites
- *Pavement mix producers*: 2 additional jobs to ensure incoming material meets specifications (for the most part, it is assumed that existing employees would handle the switch from current pavement mix to increased RAP and RAS)

Scenario 2: Projected Additional Economic Activity in the H-GAC Region (Direct, Indirect, Induced)

	Recycling Industries (Supply-Side)	Recycling Reliant Industries (Demand-Side)
Jobs	36	6
Labor Income (millions)	$2.0	$.5
Value Added (millions)	$4.4	$1.1
Industrial Output (millions)	$9.0	$2.1

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Scenario 3: Increased Plastics Recovery

- Collection and processing infrastructure expands to allow for a 50 percent increase in plastics recovery
- An end user with a capacity of 25,000 tons per year is recruited to the region
- 25 percent of the additional plastic comes from residential sector and 75 percent from commercial sector
- All additional residential tonnage and one-fourth of the additional commercial tonnage requires sorting at an existing MRF
- 75 percent of the additional commercial tonnage is sufficiently sorted to go directly to a plastic reclaimer
- Ultimately, 25,000 tons of the additional plastic will go to a new plastic end user

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Scenario 3: Current and Projected Tons of Plastic Recovered in H-GAC Region

Current	Additional	Total Projected
39,773(1)	19,886(2)	59,659

(1) Assuming 22 percent recycling rate of MSW with 1.5 percent of the total tons recycled assumed to be plastic
(2) Assuming 50% increase

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Scenario 3: Projected Increase in Jobs

- *Residential collectors*: 20 additional jobs to collect the additional plastic from residents
- *Non-residential collectors:* 5 additional jobs to collect the additional plastic from businesses
- *Material recovery facilities*: 3 additional jobs to process the additional 8,700 tons per year at existing MRFs
- *Plastics reclaimers*: 8 additional jobs at existing plastic reclaimers to process an additional 11,186 tons
- *Plastic product manufacturers*: 63 additional jobs at a new plastic manufacturer to process 25,000 tons per year

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Scenario 3: Projected Additional Economic Activity in the H-GAC Region (Direct, Indirect, Induced)

	Recycling Industries (Supply-Side)	Recycling Reliant Industries (Demand-Side)
Jobs	77	180
Labor Income (millions)	$4.2	$11.1
Value Added (millions)	$8.6	$19.5
Industrial Output (millions)	$16.4	$49.5

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Summary of Additional Economic Impact Associated with Three Scenarios

	Scenario 1	Scenario 2	Scenario 3
Recycling Industry (Supply-Side)			
Jobs	216	36	77
Labor Income (millions)	$8.4	$2.0	$4.2
Value Added (millions)	$12.6	$4.4	$8.6
Industrial Output (millions)	$20.6	$9.0	$16.4
Recycling Reliant Industry (Demand-Side)			
Jobs	-	6	180
Labor Income (millions)	-	$.5	$11.1
Value Added (millions)	-	$1.1	$19.5
Industrial Output (millions)	-	$2.1	$49.5
Reuse and Remanufacturing			
Jobs	49	-	-
Labor Income (millions)	$2.2	-	-
Value Added (millions)	$3.5	-	-
Industrial Output (millions)	$5.9	-	-

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Conclusions

Current Economic Contribution of Recycling to the H-GAC Region

- Establishments that collect and process recyclables in the H-GAC Region contribute an estimated 5,186 jobs
- When the indirect and induced effects are added, the result is an estimated 14,831 jobs
- Establishments that manufacture goods from recovered materials in the H-GAC Region contribute an estimated 744 jobs
- When the indirect and induced effects are added, the result is an estimated 1,935 jobs

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Conclusions: Current Economic Contribution of Recycling to the H-GAC Region (cont')

- Establishments that reuse and remanufacture recovered materials in the H-GAC Region contribute an estimated 3,704 jobs
- When the indirect and induced effects are added, the result is an estimated 4,784 jobs
- Establishments that recovery energy from materials recovered materials in the H-GAC Region contribute an estimated 625 jobs
- When the indirect and induced effects are added, the result is an estimated 3,327 jobs

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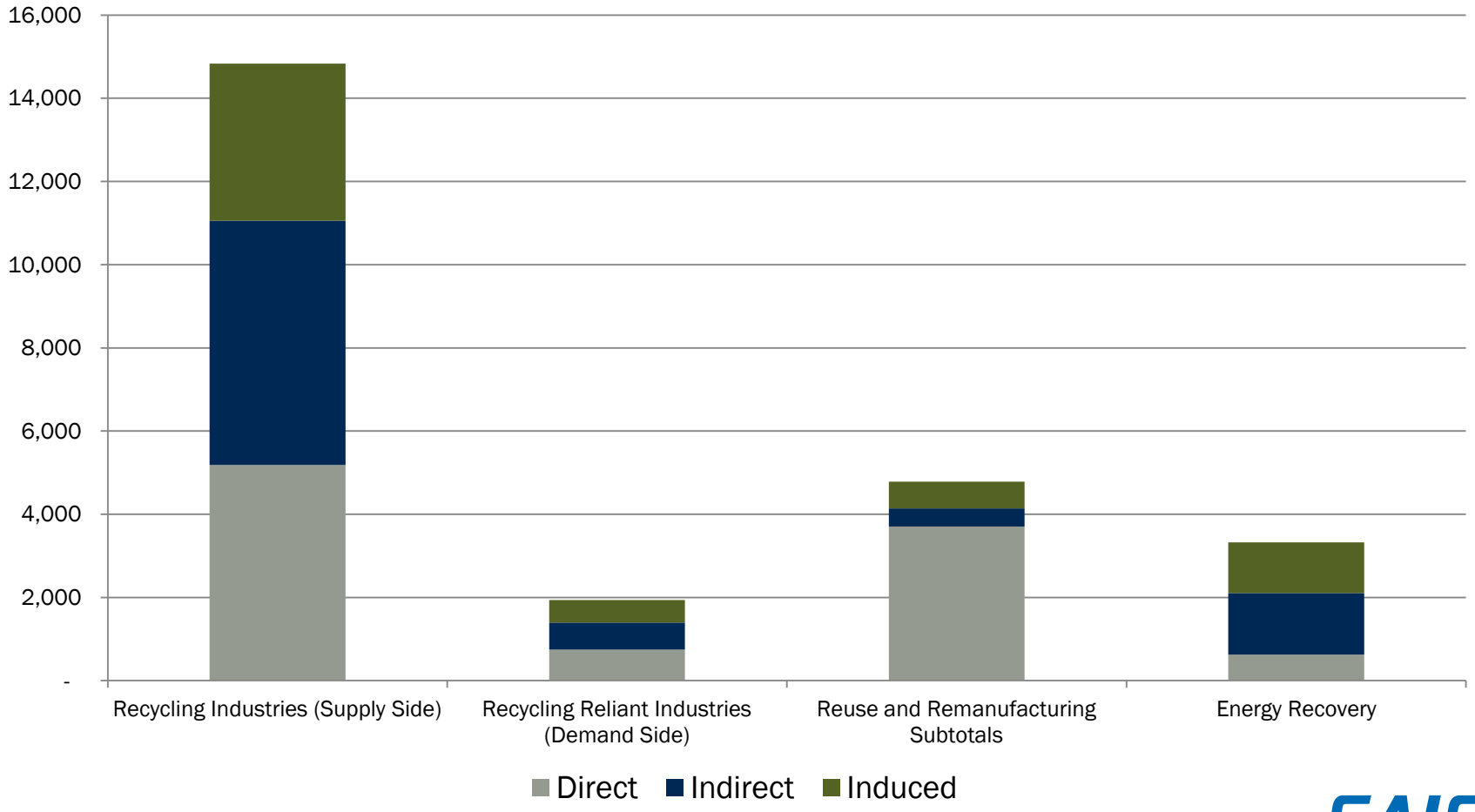
Current Jobs Attributable to Recycling



Current Economic Contribution of Recycling to the H-GAC Region

- Establishments that collect and process recyclables in the H-GAC Region contribute an estimated $1.9 billion of direct industrial output to the regional economy
- When the indirect and induced effects are added, the result is an estimated $3.3 billion of industrial output annually
- Establishments that manufacture goods from recovered materials in the H-GAC Region contribute an estimated $327 million of industrial output to the regional economy
- When the indirect and induced effects are added, the establishments that manufacture goods from recovered material contribute an $545 million of industrial output to the H-GAC Region economy annually

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Conclusions: Current Economic Contribution of Recycling to the H-GAC Region (cont')

- Establishments that reuse and remanufacture recovered materials in the H-GAC Region contribute an estimated $229 million of direct industrial output to the local economy
- When the indirect and induced effects are added, the result is an estimated $387 million of industrial output annually
- Establishments that recover energy from recovered materials in the H-GAC Region contribute an estimated $977 million of industrial output to the local economy
- When the indirect and induced effects are added, the result is an estimated $1.6 billion of industrial output annually

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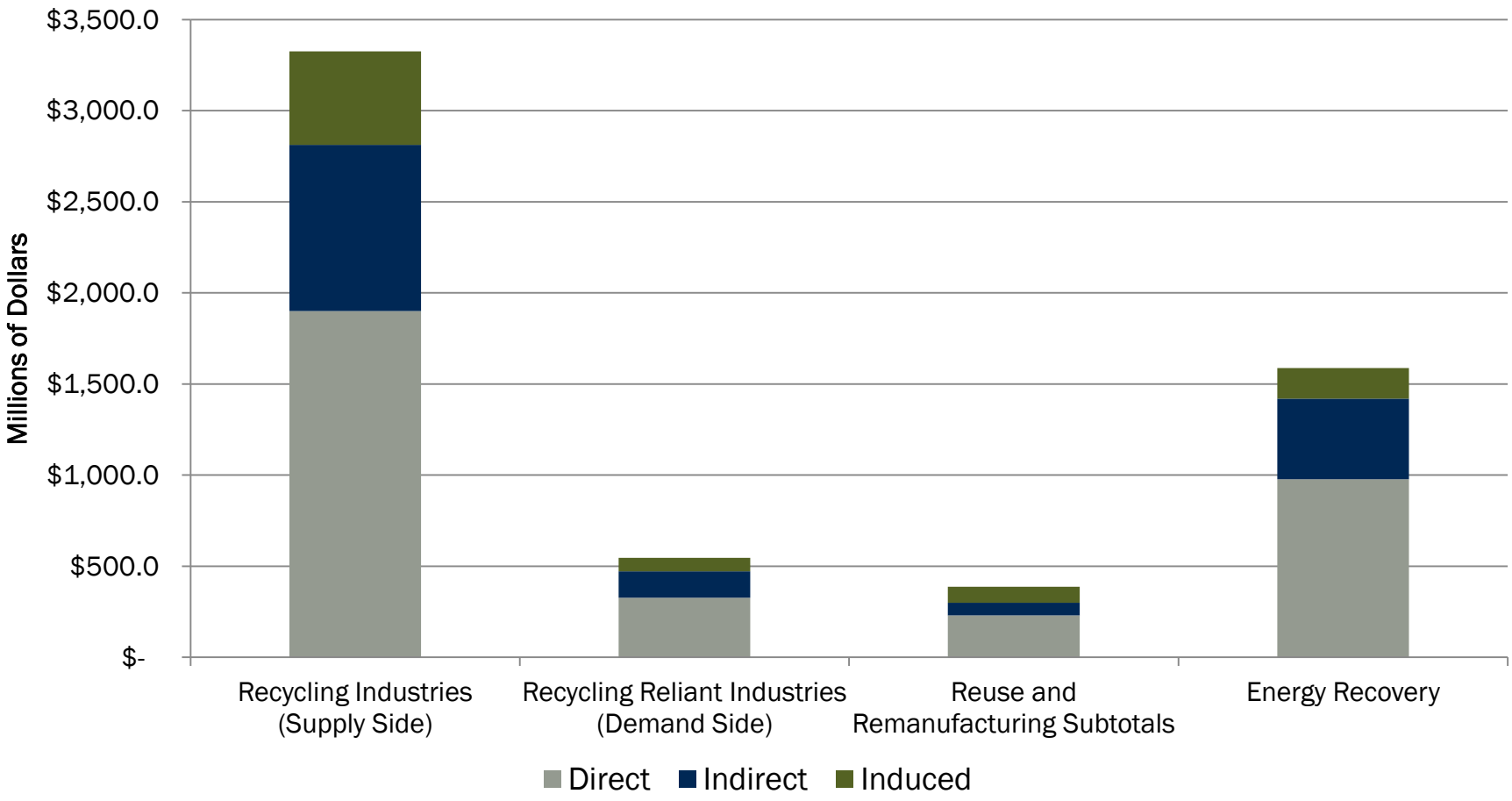
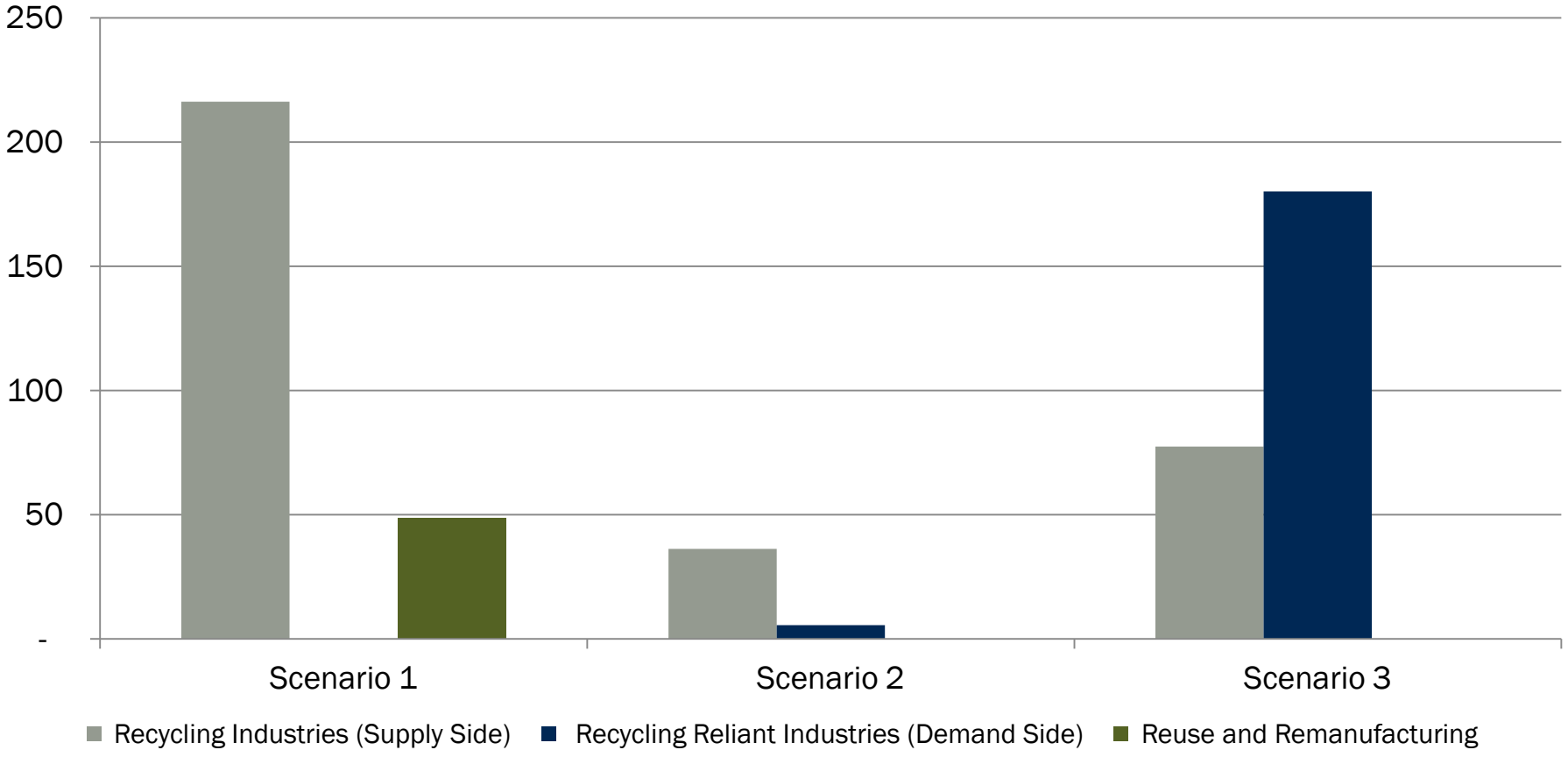
Current Industrial Output Attributable to Recycling



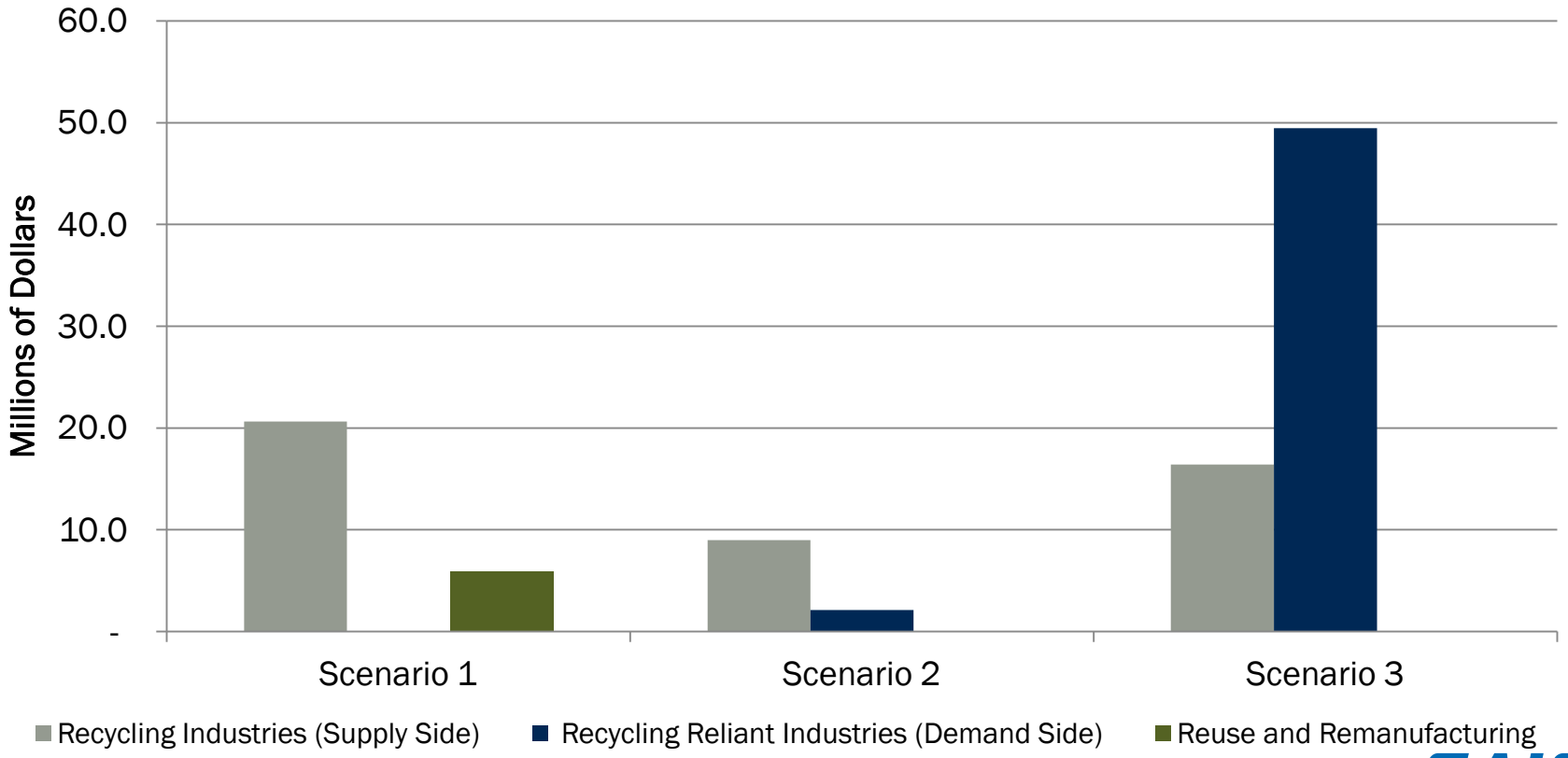
Projected Jobs Added for Each Scenario

Increased electronics recovery (Scenario 1) and increased plastics recovery (Scenario 3) are projected to create a similar number of jobs in the region



Projected Additional Industrial Output for Each Scenario

Increasing plastics recovery (Scenario 3) is projected to contribute the most additional economic activity - a new end user has a broad ripple effect on the regional economy compared to other business types



Discussion

- What do the results mean to my community?
- How do I promote the results?
- What kind of recycling businesses should be nurtured and grown?
- How do I convince decision makers to invest in recycling?
- How can I use this tool to determine the impact of other investments in the region?

Questions?

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