NEXTCYCLE MICHIGAN

GAP ANALYSIS 2021

November 2021

NEXTCYCLE
MICHIGAN

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OVERVIEW OF THE 2021 GAP ANALYSIS

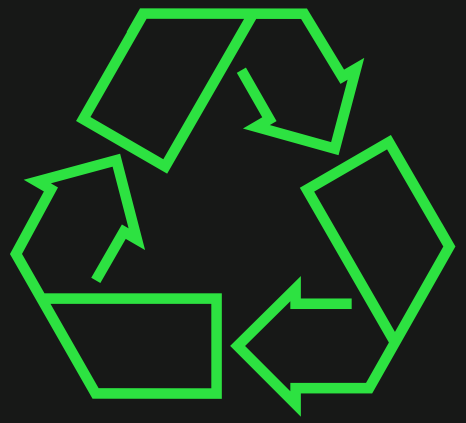
FUNDED BY THE MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY (EGLE) WHO HAS A GOAL OF:

- Increasing Michigan's recycling rate[1] to **45%**
- Growing **end-use recycling markets** in a circular economy framework
- Building the foundation for a decarbonized and thriving **Michigan economy**

PURPOSE OF 2021 GAP ANALYSIS UPDATE:

1. **Identify gaps and opportunities** in Michigan's recycling supply chain
2. Guide implementation of NextCycle Michigan **Challenge Tracks**
3. Focus activity within **Renew Partnership Portal** Projects

1 Recycling rate in this analysis is defined as the volume of municipal solid waste (MSW) recycled and composted divided by total volumes of material recycled, composted, and landfilled. Recycling rate differs from diversion rate in which diversion rate includes materials that can be diverted from the landfill considering reduction, reuse, recycling, and composting (i.e., using reusable utensils instead of disposable, textiles collection, home composting).



MICHIGAN'S 2019 RECYCLING RATE

18.0%

8,012,760	1,763,083
MSW DISPOSED	*RECYCLED TONNAGE*

additional **2.6 million tons**
needed to reach **45%**

ECONOMIC BENEFITS OF REACHING 45% IN MICHIGAN

IF MICHIGAN'S RECYCLING RATE REACHED 45%, THE RECYCLING, REUSE, AND RECOVERY INDUSTRY WOULD TOTAL…

138K
JOBS IN MI

$9.0B
TOTAL ANNUAL LABOR INCOME

$33.8B
ECONOMIC OUTPUT

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SUMMARY OF GAPS AND OPPORTUNITIES

Collection Programs

SUMMARY OF GAPS AND OPPORTUNITIES

- **Data Gap:** There is is an opportunity to fill gaps in the data currently available; data can be filled by further research and analysis, EGLE MegaData project, and/or industry partner data.
- **Program Gap:** There is an opportunity to fill gaps in collection, processing, infrastructure, funding, markets

COLLECTION

	Data Gap	Program Gap
Comprehensive drop-offs	●	●
Hauler networks	●	●
Commercial, rural, and multi-family collection	●	●
Organics collection, esp. food waste (incl. rescue/recovery)	●	●
Glass collection		●
Plastics collection		●
Cardboard (OCC) collection		●

PROCESSING

	Data Gap	Program Gap
New commercial and residential MRFs	●	●
MRF hub and spoke recycling network		●
MRF equipment upgrades and innovations		●
Composting, esp. food waste and cannabis plant waste		●
AD, esp. food waste and food processing waste		●

EDUCATION

	Program Gap
Community communications on drop-off and curbside programs	●
Waste prevention and localized recycling solutions	●

END MARKETS & SUPPLY CHAINS

	Data Gap	Program Gap
Aluminum (UBC)	●	●
Cardboard (OCC)	●	●
Mixed Paper	●	●
Cartons	●	●
Steel	●	
Glass, esp. non-deposit	●	●
Compost and Compost-based products	●	●
Plastics, esp. recycled PET, recycled colored HDPE, mixed plastics and films	●	●
White goods	●	
Electronics	●	
Batteries	●	●
Mattresses	●	●
Textiles	●	
Shingles	●	●
Tires	●	●

POLICY

	Data Gap	Program Gap
Organics waste prevention and recycling, esp. food waste and cannabis waste	●	●
Commercial, institutional and residential data reporting and tracking	●	●

PROGRAM INVESTMENT

	Program Gap
38% progress toward the $1B investment goal	●
Align grant programs and NextCycle Challenge Tracks with funding partners	●
Leverage public and private industry investment	●

UNDERSERVED REGIONS

	Program Gap
SW MI greatest opportunity for significant recovery	●
Rural areas - limited or no curbside recycling	●
Rural areas - limited or no commercial recycling collection	●
Rural areas - limited or no drop-off sites	●
Local end markets for recyclable materials	●
Local end markets for compost-based products	●

COLLECTION PROGRAM GAPS AND OPPORTUNITIES

NEED FOR INCREASED COLLECTION INFRASTRUCTURE FOR RECYCLING AND ORGANICS

- Focus on food waste, glass, plastics and corrugated cardboard
- Multi-family and rural residential curbside
- Commercial and institutional collection
  - Mixed recyclables
  - Cardboard and mixed paper
  - Plastic film
  - Other
- Comprehensive drop off sites
  - 100 strategically placed comprehensive drop-off centers would provide access to 98% of Michiganders
  - 17 sites in densely populated areas would provide recycling access to half of MI population
  - Recycling drop-offs would provide an additional 411,950 tons/year

BETTER COMMUNICATION TO PUBLIC ABOUT DROP OFF AND CURBSIDE PROGRAMS

COLLECTION PROGRAM GAPS AND OPPORTUNITIES

EGLE FUNDING PRIORITY RECOMMENDATION

- Continue to fund residential, commercial and multi-family carted recycling and organics collection infrastructure, with strong educational support, while funding the expansion of commercial and residential drop-off recycling capacity across the state.

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SUMMARY OF GAPS AND OPPORTUNITIES

Processing Capacity

PROCESSING CAPACITY GAPS AND OPPORTUNITIES

- At the current rate, the state will need to recycle an additional 1,173,000 tons/year to reach 45% goal
  - *This amount equals 12-59 new or expanded commercial and residential MRFs*
  - *Refer to interactive map: https://www.nextcyclemichigan.com/mrfs-base-map*
- Increased capacity through increased work hours, equipment upgrades and expansion of existing MRFs – processing capacity needed to increase regionally to meet goal
- Emphasis on hub and spoke MRF models
- Potential for a portion of waste generated by Commercial and Institutional sectors, especially corrugated cardboard, to go straight to processors and end markets (as processing and collection networks grow)
- Not part of the 45% recycling rate calculation but need for increased tire recovery and alternative uses of scrap tires for road building

PROCESSING CAPACITY GAPS AND OPPORTUNITIES

EGLE FUNDING PRIORITY RECOMMENDATION

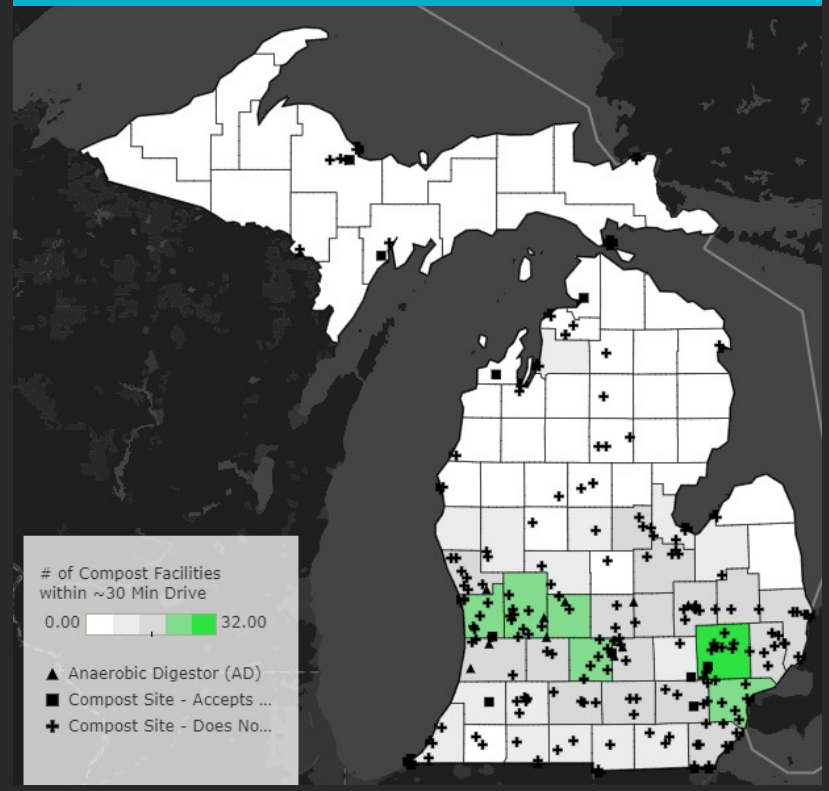
- Continue to fund expanded and upgraded residential and commercial hub and spoke recycling and organics processing infrastructure, with focus on food waste and working with industry partnerships and their matching grant capacity in key challenging packaging formats (glass, mixed plastics, PP, PET, food and beverage cartons, OCC and mixed paper).

PROCESSING CAPACITY

MATERIAL RECOVERY FACILITIES

Data Source: Government Advisory Associates (GAA) and RRS. Gaps in recycling processing data in Michigan exist due to challenges associated with data tracking and transparency in the state

ORGANIC WASTE PROCESSING FACILITIES



Data Source: Waste Data System & RRS Databases. Based on Most recent available data. MI measures organics in cubic yards. Cubic yardage wase converted to tons by RRS. Gaps in data exist due to challenges associated with data tracking & transparency

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SUMMARY OF GAPS AND OPPORTUNITIES

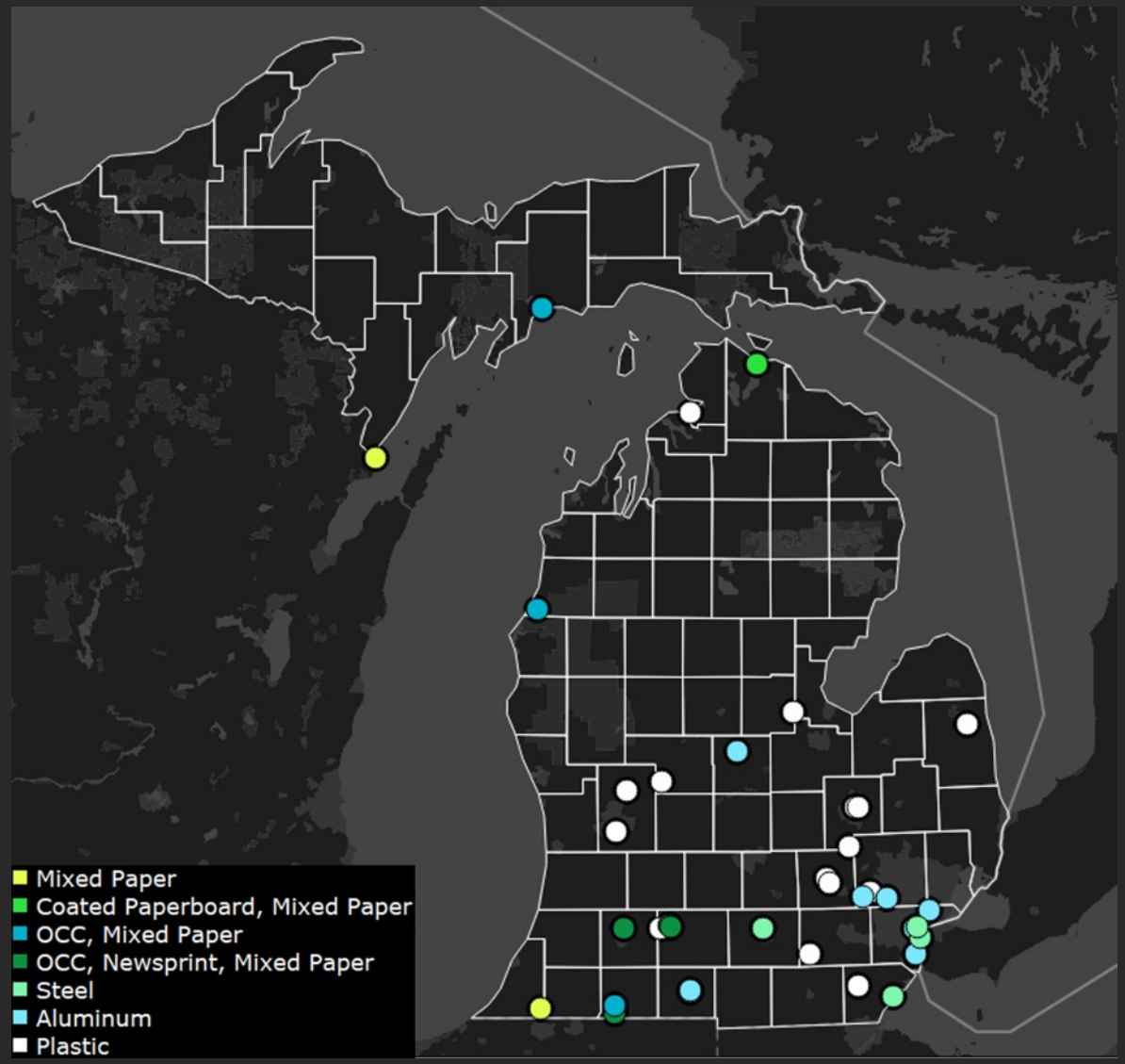
End Markets

END MARKET GAPS AND OPPORTUNITIES

- Increasing consumer demand for recycled PET (rPET) and recycled Colored High-Density Polyethylene (rCHDPE)
- Plastics 3-7, including films and flexibles, need further supply chain development in MRF to end-market
- Growing end market demand for cardboard and mixed paper, as well as cartons
- Glass (outside of deposit law) need improved supply chain and infrastructure to feed end markets – end markets looking for increased quality glass cutlet
- Other areas for significant end market development:
  - *Lower-value grade plastics*
  - *Wood waste and wood waste-based products (mulch, pellets, recovered wood products)*
  - *Compost and compost-based products (soil erosion, green stormwater infrastructure, soil remediation, landscaping, agriculture)*
  - *Textiles*
  - *Asphalt shingles*
  - *Tires*

MICHIGAN END MARKETS

Michigan does not have any glass cullet plants or aluminum UBC plants



Data Source: RRS Database
Refer to interactive map: https://www.nextcyclemichigan.com/end-markets-base-map

END MARKET GAPS AND OPPORTUNITIES

EGLE FUNDING PRIORITY RECOMMENDATION

- Continue to fund demand driving end-market investments, including those that increase recycled content in purchasing practices and feedstock prep for manufacturing, with special focus on priority gap areas including glass, aluminum UBC, mixed plastics, PP, PET, food and beverage cartons, OCC and mixed paper.

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SUMMARY OF GAPS AND OPPORTUNITIES

Program Investment

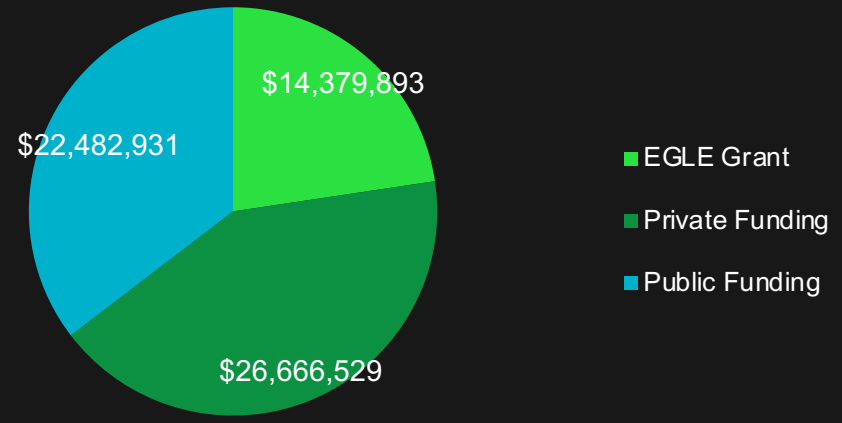
PROGRAM INVESTMENT

$1B in capital investment is required in all components of infrastructure and related programming to support 45% goal

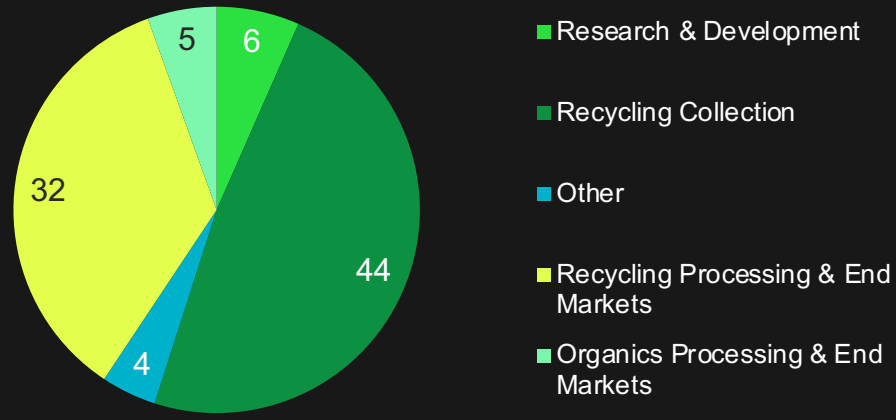
$381,374,787 tracked to date, for completed and underway projects, about 38% progress

The most up-to-date data can be found here:
https://nextcyclemichigan.com/investment-map

PROJECT SUPPORT INVESTMENT
(Completed and publicized projects only)



NUMBER OF PROJECTS BY FOCUS AREA



August 2021 - https://www.nextcyclemichigan.com/investment-map

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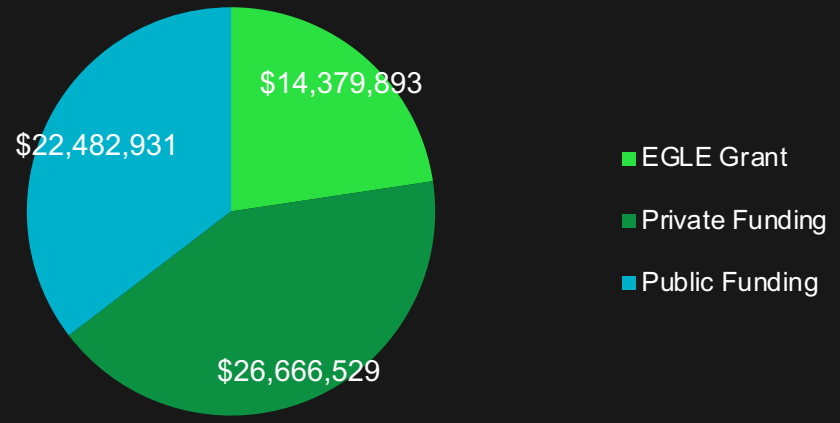
PROGRAM INVESTMENT

EGLE FUNDING PRIORITY RECOMMENDATION

- Continue to use grant program to leverage public and private industry investment in the state's recycling infrastructure and related programming, working with grant matching formulas to encourage that investment and coordinating grant programs and NextCycle Challenge Tracks align with grant matching partners like the Alliance to End Plastic Waste, Glass Packaging Institute, PP Recycling Coalition, Closed Loop Partners, the Carton Council, the Foodservice Packaging Institute and the Recycling Partnership, along with internal State of Michigan funding partners like the EGLE Scrap Tire fund, MDOT road funding and both state and local American Rescue Plan stimulus funds.

PROJECT SUPPORT INVESTMENT
(Completed and publicized projects only)



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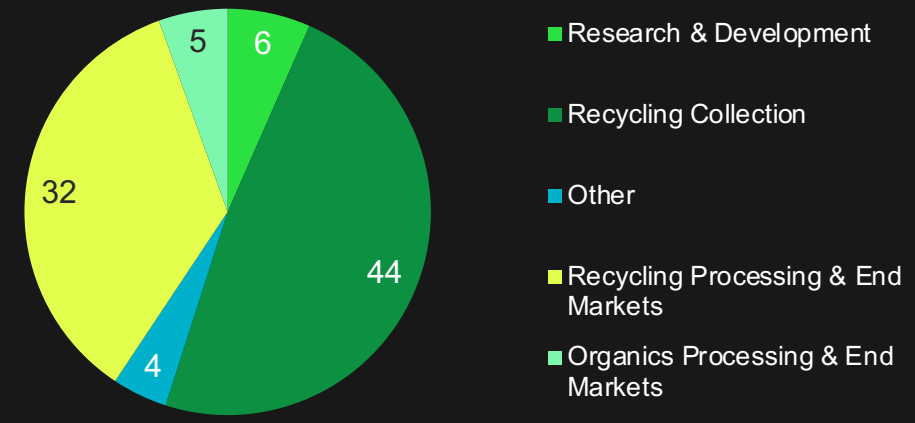

August 2021 - https://www.nextcyclemichigan.com/investment-map

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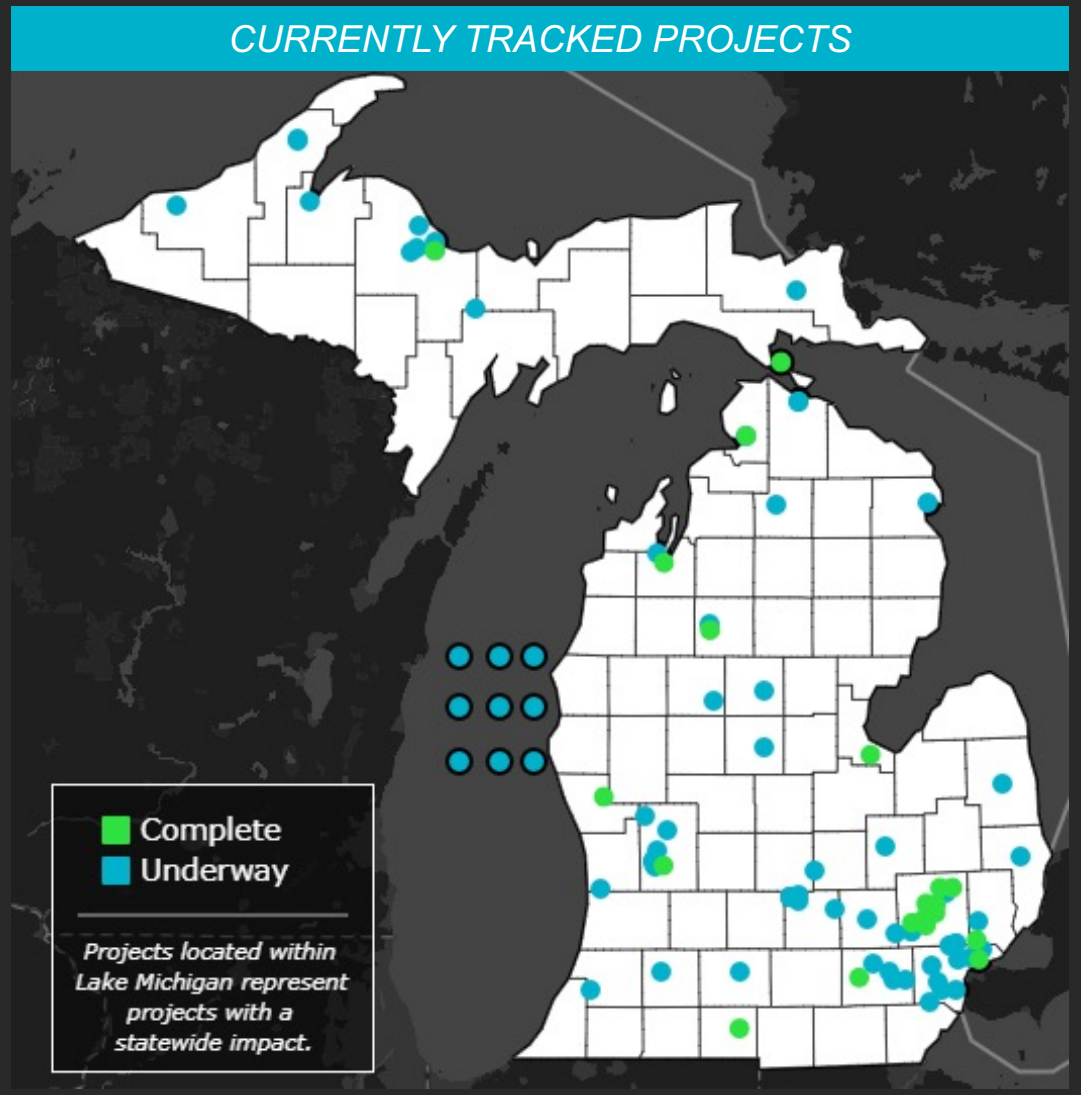
SUMMARY OF GAPS AND OPPORTUNITIES

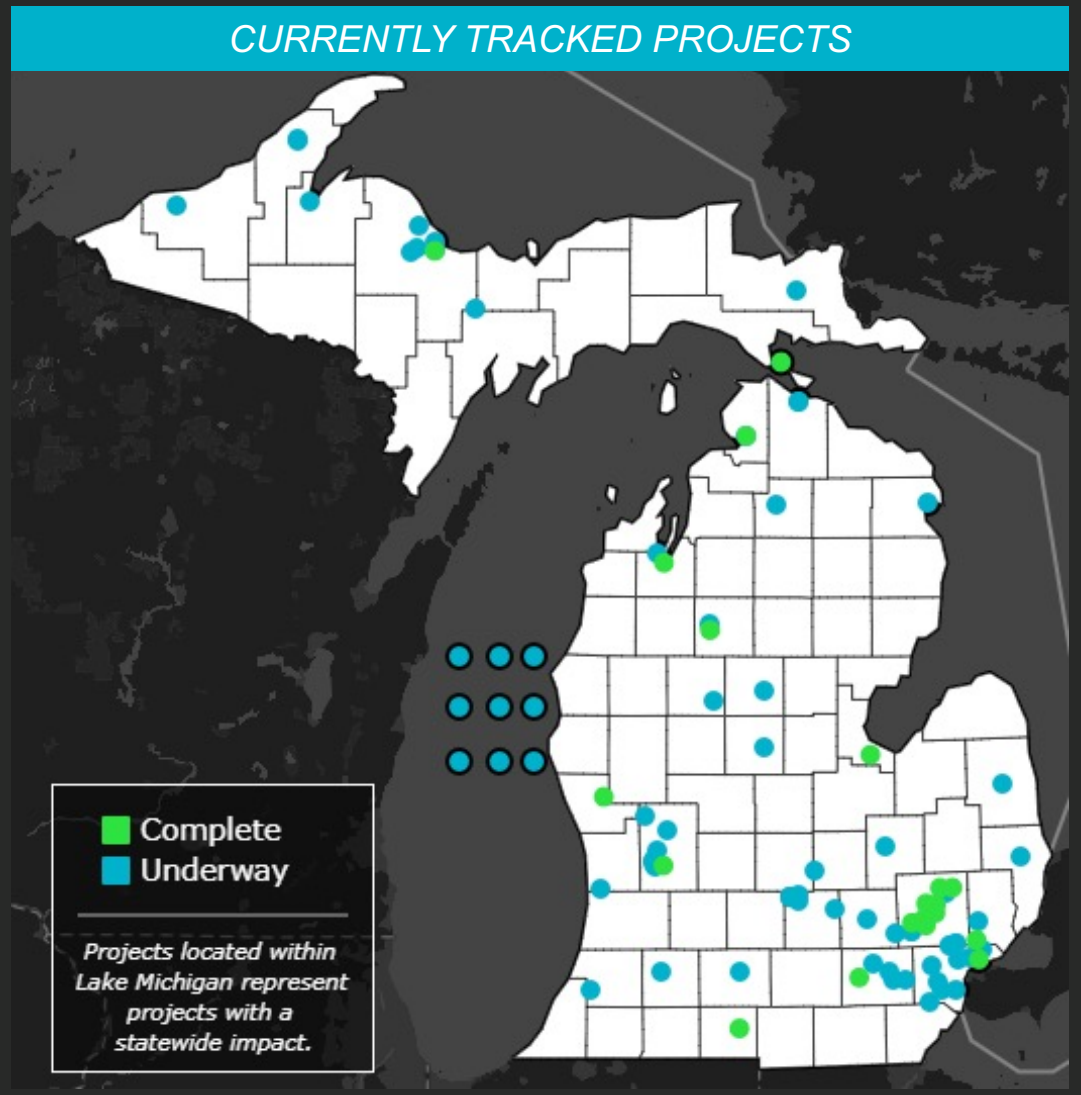
Underserved Regions of the State



August 2021 - https://www.nextcyclemichigan.com/investment-map

UNDERSERVED REGIONS OF THE STATE

- Southeast region of Michigan represents the largest demographic and hence the greatest opportunity for significant recovery
- Rural areas of Michigan have limited or no curbside recycling or commercial recycling collection service
  - Limited drop off sites for residential or commercial recycling
  - No comprehensive drop-off centers for bulky or hard-to-recycle materials
- Inadequate food scrap/organics collection programs or end markets throughout the state



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UNDERSERVED REGIONS OF THE STATE

EGLE FUNDING PRIORITY RECOMMENDATION

- Continue to use grant program to expand super drop-off recycling and processing centers in both rural and urban areas across the state, expanding access to traditional recycling (paper and containers) and reuse opportunities (textiles, furniture, shoes, electronics, etc.), as well as those challenging materials that homes and small businesses across the state generate (tires, e-scrap, bulky and challenging materials like mattresses, carpet, Styrofoam, film, stretch wrap, etc.)

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OPPORTUNITIES FOR NCMI INITIATIVE

FLOWS: SUMMARY OF GAPS & OPPORTUNITIES

- Access, collection, processing, and end market development for organics all present opportunities for growth in all regions of the state.
- Management options for food waste include prevention, rescue/recovery and recycling;
- Policy and education throughout the state need to support the entire value chain,
- Residential and commercial food scrap collection, processing capacity, and marketable compost development are stand-out priorities for this track.
- End market development for compost and other by-products of organics processing offer diverse and multiple opportunities, from agriculture to erosion control to roadway construction and more.
- Hemp and cannabis plant waste collection and composting opportunities for landfill diversion are being developed and are likely to grow this industry in the coming years.

RSC: SUMMARY OF GAPS & OPPORTUNITIES

- Capacity to move cardboard and mixed paper from residential and commercial sources
- Further development on plastics 3-7 and films/flexibles
- Improve supply chain infrastructure for glass recycling for formats not covered by deposit law
- Comprehensive curbside collection and drop sites for residential, multi-family, commercial, and institutional use.
  - Comprehensive drop-off centers statewide will provide convenient access for up to half of the material stream that cannot be recovered curbside. Strategically placing 17 comprehensive drop-off centers would provide convenient access (within 30-minute drive) to almost half of all Michiganders in the state, including rural areas.
- Hub and spoke MRF infrastructure development to meet the growing need for processing.
- Build infrastructure and end markets for materials that demonstrate recovery potential such as bricks, blocks, rubble, and textiles

I2P3: SUMMARY OF GAPS & OPPORTUNITIES

- Public-public, public-nonprofit, and public-private partnerships are essential to developing a robust circular economy in Michigan, with opportunities to have significant impact across all identified gaps.
- Intergovernmental agreements, development of authorities, and other available mechanisms offer opportunities to close gaps in access, processing, and end markets to increase cost effectiveness and efficiencies across the supply chain.
- Best practice policy development at the local and regional level can achieve significant outcomes. Policy development and implementation can improve access, waste reduction, collection, communication, and outreach, and increase use of compost and other recyclables in many applications.

ROADS: SUMMARY OF GAPS & OPPORTUNITIES

- Road-building provides ample opportunity for investment, innovation, and partnership in the increased use of recycled-content materials that are high priorities for end market development, including post-consumer glass, asphalt shingles, tires, and compost. The use of mixed plastics in drain beds and other applications also offers opportunities for increased recovery.

- Applications can be broad across many types of hardscape surfaces including state, county, and local roadways, supporting transportation infrastructure (e.g., rest-areas, park and ride lots, stormwater management infrastructure, service ramps, etc.), pathways and trails, institutional, commercial and multi-family residential parking, sidewalks and hardscapes, playground surfaces, and more.

- Many recycled content treatments are proven and ready to scale including rubber modified asphalt (RMA) for paving, tire derived aggregate (TDA) for drainage, retention systems and the like, tire derived sealers (TSD aka chipseal), pulverized glass as a cementitious pozzolanic additive to concrete projects, compost and wood chip use in stormwater run-off management, pathways, and road right of ways and medians, and more.

RIT: SUMMARY OF GAPS & OPPORTUNITIES

- The development of an innovative process, product, or service that increases the use of recyclables that are lacking end markets represents a significant opportunity for economic development and diversion in Michigan.

- Materials prioritized for innovation initiatives include glass, textiles, tires, wood waste, food scraps, mixed plastics, film plastics, tires, and asphalt shingles.

- Innovations in sortation technology, including improvements in robotics, conveyance, AI, and decontamination all represent opportunities for investment.

MICROS: SUMMARY OF GAPS & OPPORTUNITIES

- Access, collection, processing, and end market development sometimes start small, and some communities, entrepreneurs or endeavors may need only a small boost of funding, expertise, or mentorship to get an idea off the ground.

- Many communities with interest in collaborating across their region lack the resources to meet and develop collaborative approaches to filling gaps in diversion in their areas.

- Demonstration projects that are replicable at small scale, or scalable, can take their next step towards implementation to determine viability for growth and investment.

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DATA INFORMING THE 2021 GAP ANALYSIS UPDATE

OUTLINE OF UPDATES

RECYCLING RATE: *Highlights the 2019 18% recycling rate and breakdown of the material recovery by category*

INVESTMENT UPDATES: *Demonstrates the investment need of more than $1 Billion in infrastructure projects such as processing facilities, second processing and end markets of recoverable materials as well as collection containers and trucks to haul materials*

INFRASTRUCTURE UPDATES AND POTENTIAL ADDITIONAL RECOVERY: *Details the existing infrastructure and summarizes the potential recovery through recycling facilities, drop-offs and organics processing, their gaps and recommended next steps*

COMMUNITY PROGRAM COMMUNICATION ACCESS: *Summarizes the data that has been collected to date through the Michigan Materials Management and Infrastructure Program Project on residential diversion program information including communication to residents on the availability of curbside and drop-off programs*

END MARKET UPDATES: *Identifies end market trends by commodity type, and suggests investment in collection, processing, and end market development where there is insufficient market capacity*

ECONOMIC BENEFITS OF REACHING 45% IN MICHIGAN

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ECONOMIC OUTPUT

GREENHOUSE GAS EMISSIONS REDUCTION OF 7M TONS IF MICHIGAN REACHED 45% RECYCLING RATE IN MICHIGAN

7M tons of GHG emission reductions per year is the equivalent of…

GHG emissions from

1,498,030

passenger vehicles driven for one year

GHG emissions avoided by

760,731

households' energy consumption

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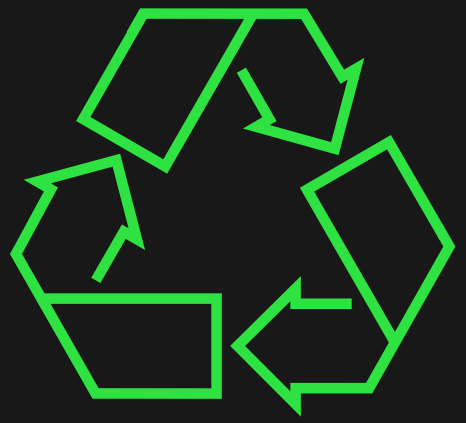
DATA INFORMING THE 2021 GAP ANALYSIS UPDATE

Recycling Rate Update



MICHIGAN'S 2019 RECYCLING RATE

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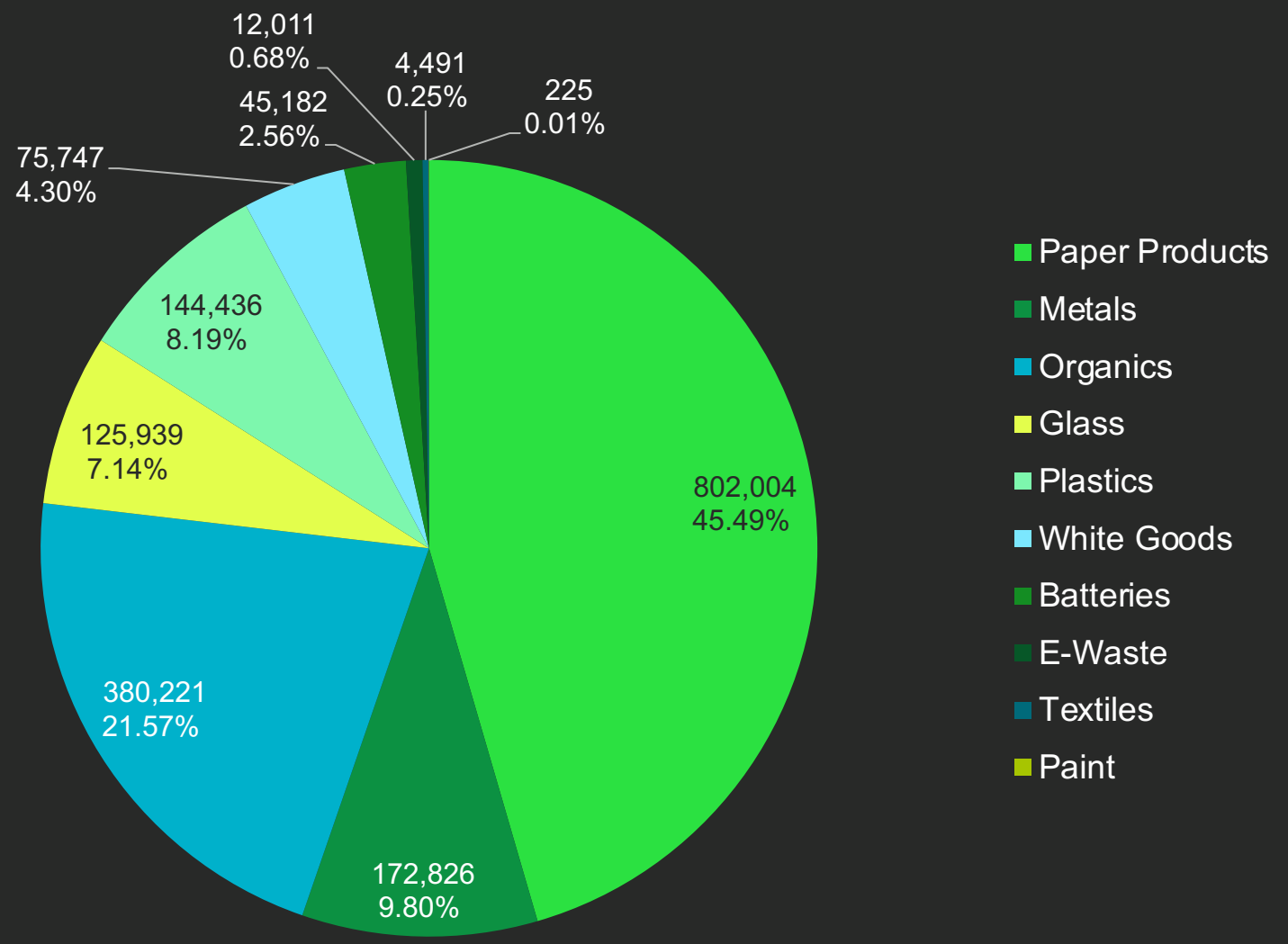
8,012,760	1,763,083
MSW DISPOSED	*RECYCLED TONNAGE*

additional **2.6 million tons**
needed to reach **45%**

MATERIAL RECYCLED BY CATEGORY

(2019 data)

1.763 MILLION TONS



CURRENT ESTIMATED RECOVERY

Net total estimated for diverted and recycled material in 2019 of 1,763,083 tons

Material	Percent	Total Tons	EGLE Reported Tons (Adjusted)	EGLE Reported Additional Single Stream (Distributed)	Bottle Deposit Tons	Other Estimated Tons
Paper Products	45.49%	**802,004**	789,596	12,408		
Ferrous Metals	6.60%	**116,445**	111,887	1,758		2800
Nonferrous Metals	3.20%	**56,381**	23,349	367	32,665	
Glass	7.14%	**125,939**	29,526	464	95,949*	
Plastics	8.19%	**144,436**	113,530	1,784	29,122	
Organics	21.57%	**380,221**	380,221			
White Goods	4.30%	**75,747**				75,747
Batteries	2.56%	**45,182**				45,182
E-Waste	0.68%	**12,011**				12,011
Textiles	0.25%	**4,491**	4,371			120
Paint	0.01%	**225**				225
Total	**100%**	**1,763,083**	**1,452,480**	**16,781**	**157,737**	**136,085**

*Deposit Glass was 95,949 tons or 76.1% of the estimated glass recovery

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DATA INFORMING THE 2021 GAP ANALYSIS UPDATE

Take Back Programs

TAKE-BACK PROGRAMS: CONTAINER DEPOSITS

Material	Container Weight (lbs)	% Of Stream	# Of Containers	Weight (lbs)	Weight (Tons)
Glass	0.4366	13%	439,530,000	191,898,798	95,949
PET	0.0749	23%	777,630,000	58,244,487	29,122
Aluminum	0.0302	64%	2,163,840,000	65,330,560	32,665
TOTAL			**3,381,000,000**	**315,473,845**	**157,737**

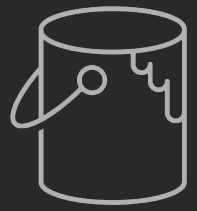
TAKE-BACK PROGRAM DATA SOURCES

Batteries

- Association of Battery Recyclers
- Call2Recycle
- 45k tons recycled in 2019

Textiles

- Nearly 7,000 bins, store drop-offs and free household collection services
- Non-profit and for-profit textile recyclers
- Secondary Materials and Recycled Textiles (SMART)
- ~4.5k tons recycled in 2019

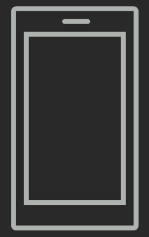


Hazardous Household Waste

- MRFs and County Programs
- Paint Recycling
- 225 tons recycled in 2019

White Goods

- Includes refrigerators, freezers, dehumidifiers, air conditioners, dishwashers, washers and dryers, and stoves
- US EPA databases
- Energy Waste Reduction reports
- 75k tons recycled in 2019



E-Waste

- State Electronics Reuse and Recycling Program
- 12k tons recycled in 2019

TAKE-BACK PROGRAM TOTALS

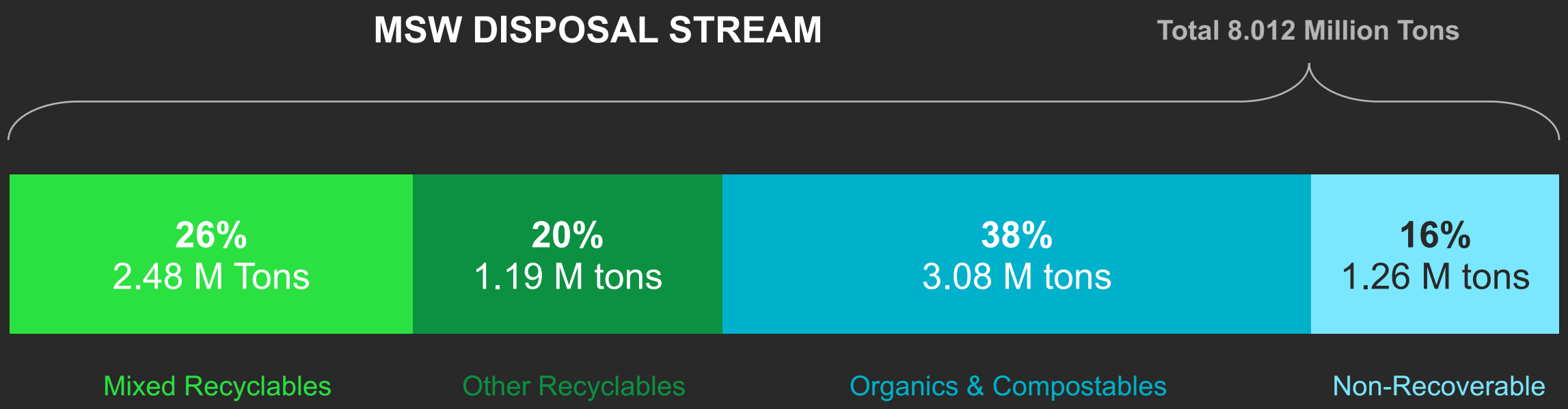
The assessment of diverted materials resulted in an estimate of an additional *140,456 tons* of material diverted and recycled from e-waste, textiles, batteries, white goods, paint, and metals recovered from incinerators.

MATERIAL	TONS COLLECTED
Total E-Waste	12,011
Total Batteries	45,182
Total Paint	225
Total White Goods	75,747
Recovered Metal*	2,800
Total Textiles	4,491
Total	**140,456**

**Reported by Kent County Incinerator (Covanta)*

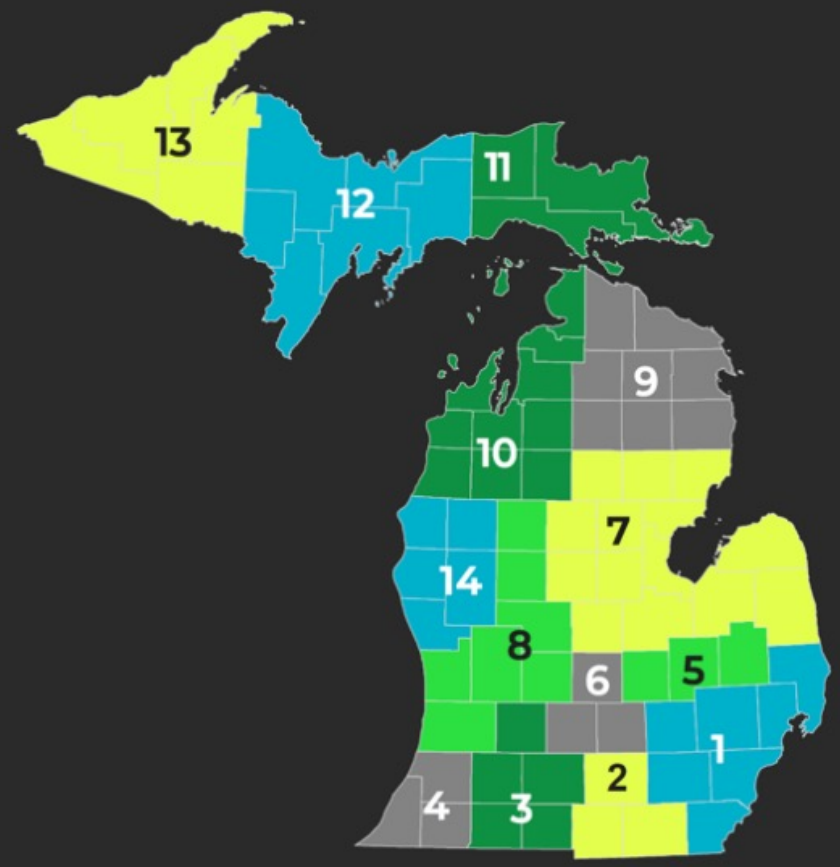
TONS OF MSW DISPOSED IN MICHIGAN

8 Million tons of municipal solid waste [MSW] disposed in 2019



TOTAL 2019 MICHIGAN MUNICIPAL SOLID WASTE DISPOSAL BY COG

Council of Gov'ts (COG)	Mixed Recyclables	Other Recyclables	Organics & Compostables	Non-recoverable	Total
1	1,161,043	560,253	1,446,549	590,757	3,758,610
2	73,870	35,646	92,035	37,586	239,137
3	139,606	67,366	173,935	71,034	451,940
4	68,602	33,104	85,472	34,906	222,084
5	130,769	63,102	162,926	66,537	423,334
6	117,546	56,721	146,451	59,809	380,528
7	212,987	102,776	265,362	108,371	689,496
8	306,535	147,916	381,913	155,970	992,334
9	32,437	15,652	40,414	16,505	105,008
10	74,626	36,010	92,977	37,971	241,585
11	13,315	6,425	16,589	6,775	43,105
12	53,878	25,999	67,127	27,414	174,418
13	19,187	9,259	23,905	9,763	62,114
14	70,760	34,145	88,160	36,004	229,067
Total	**2,475,162**	**1,194,373**	**3,083,816**	**1,259,401**	**8,012,760**



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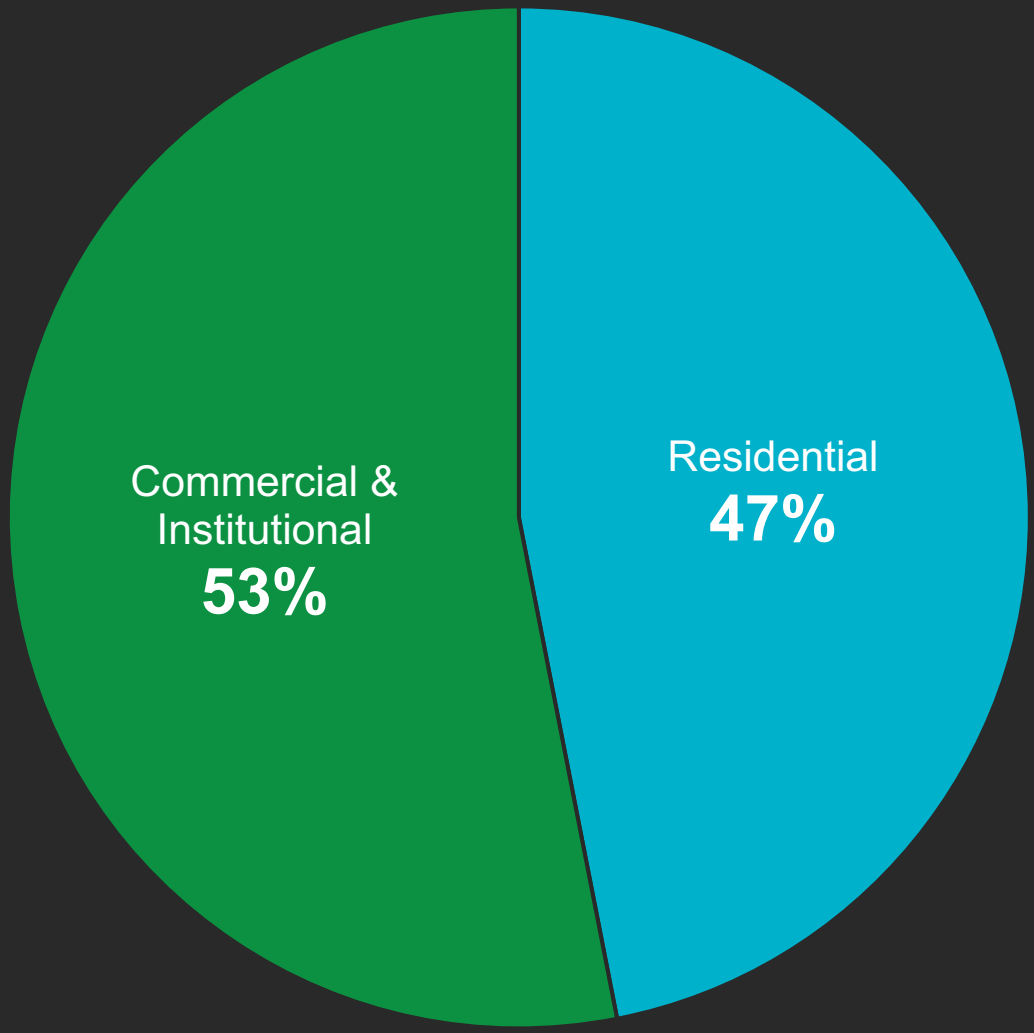
SOURCE OF MUNICIPAL SOLID WASTE DISPOSAL

Municipal solid waste is generated by residents, businesses, and institutions. Increasing Michigan's recycling rate will mean expanded diversion programs for all three of these sectors.



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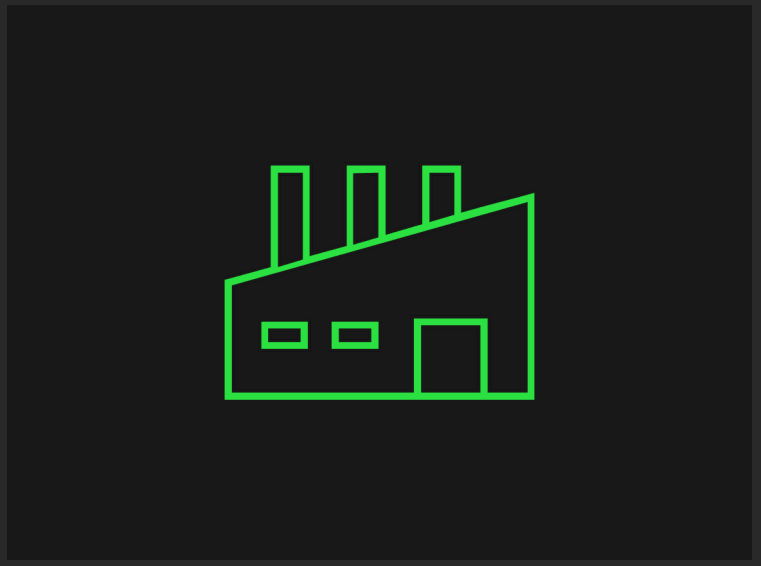
DATA INFORMING THE 2021 GAP ANALYSIS UPDATE

Investments Updates

INVESTMENT UPDATES

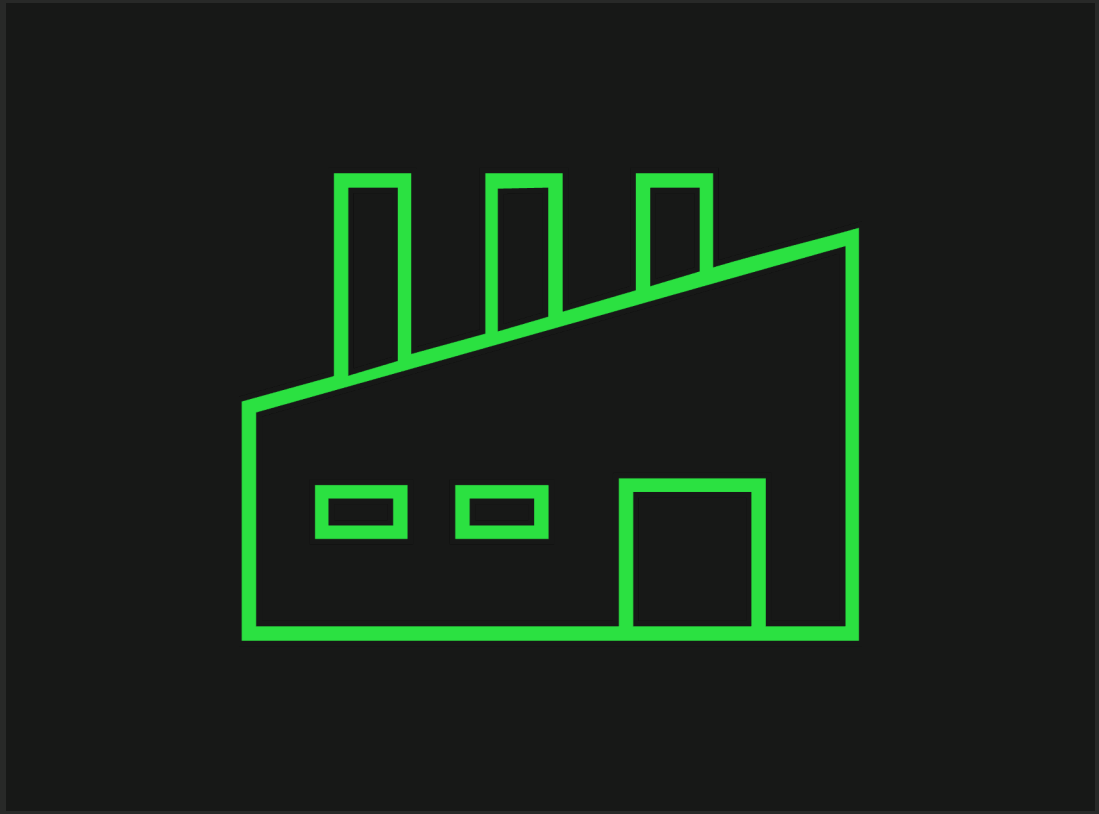


Transfer, Primary and Secondary Processing and End Markets

Collection Carts Containers and Trucks

Support Services

TRANSFER, PRIMARY & SECONDARY PROCESSING & END MARKETS



- Recycling facilities
- Compost facilities
- Hub and spoke transfer networks for recyclables and organics
- Super drop-off convenience and take back centers
- Secondary processing facilities
- End market capacity expansions

COLLECTION CARTS, CONTAINERS AND TRUCKS

- Curbside recycling carts
- Curbside organics carts
- Recycling roll-offs for high density drop-offs
- Commercial recycling collection containers
- Commercial organics collection containers
- Multi-family recycling dumpsters
- Automated curbside collection trucks
- Semi-automated curbside collection trucks
- Front load collection trucks
- Roll-off collection trucks
- Support vehicles

SUPPORT SERVICES

- Curbside Cart Roll-out and Targeted Local Education
- Research and Development
- Statewide Outreach/Engagement/ Messaging
- County Recycling Plans
- Program Support/Management

BUILD OUT STAGES

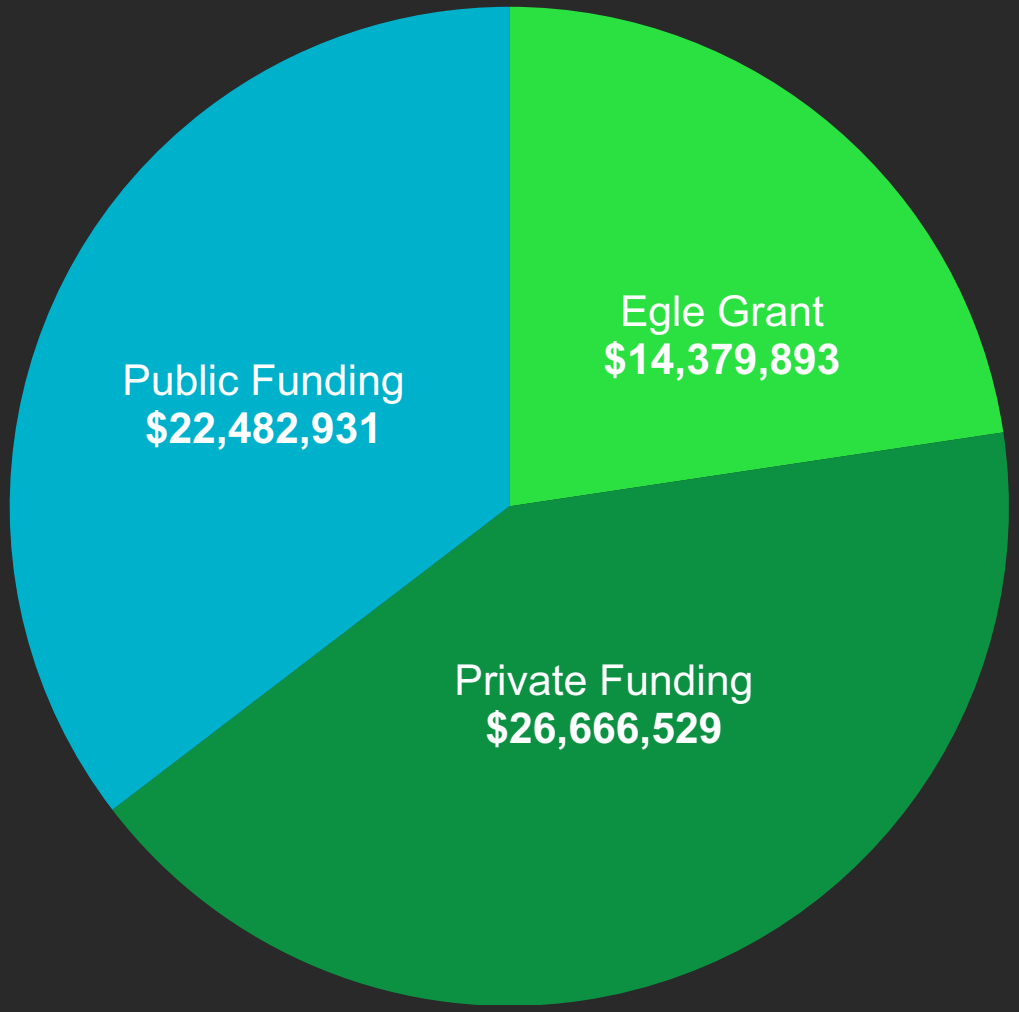
	Processing and End Markets	Containers and Trucks	Support Services	Total Investment
Completed or Underway Investments	$ 247,299,802	$ 14,186,327	$ 1,728,589	$ 263,214,718
Planned or Under Development	$ 34,396,000	$ 71,214.00	$ -	$ 34,467,214
Under Discussion	$ 71,040,000	$ -	$ -	$ 71,040,000
Target Investment	$ 687,800,000	$ 320,325,000	$ 37,870,082	$ 1,045,995,082
Remaining for Target (Gap)	$ 335,064,198	$ 306,067,459	$ 36,141,493	$ 677,273,150

August 2021 - https://www.nextcyclemichigan.com/investment-map

BREAKDOWN OF PUBLIC AND PRIVATE INVESTMENT

(COMPLETED PROJECTS ONLY)

Over $14M in EGLE Recycling Grants since 2018 have been leveraged by Public and Private investments to support project implementation. This graph demonstrates the nearly $50M of public and private investment which leverages the contributions from EGLE Recycling Grants supported from Renew Michigan funds.



August 2021 - https://www.nextcyclemichigan.com/investment-map

NEXTCYCLE MICHIGAN

DATA INFORMING THE 2021 GAP ANALYSIS UPDATE

Infrastructure Updates and Potential Additional Recovery

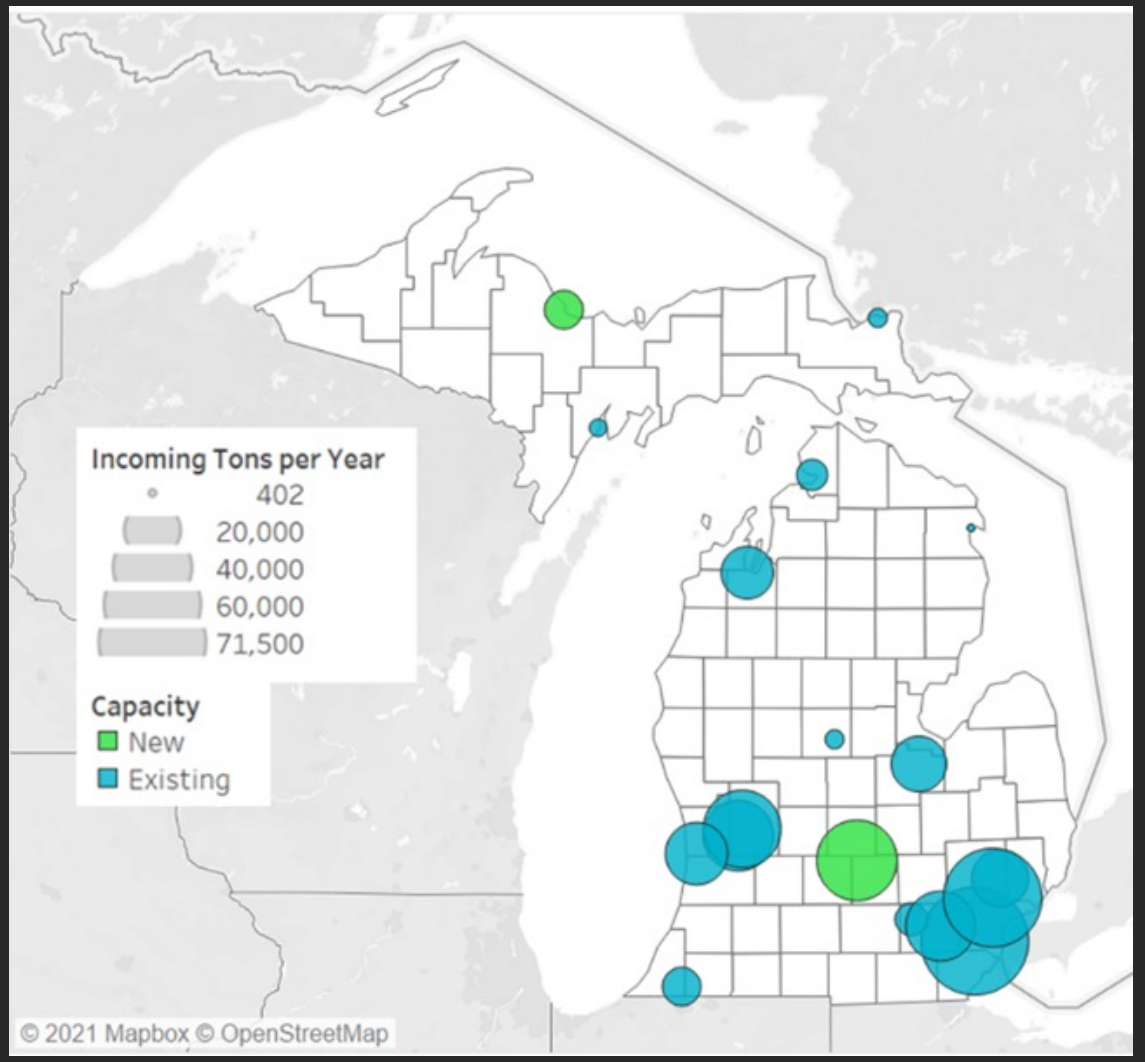
ADDITIONAL DIVERSION AND INFRASTRUCTURE GAPS

	Needed Capture Rate Out of Disposal to Get to 45% Diversion	Additional Collection Tons	Identified Infrastructure Gap	Accomplishments Since 2020 Gap Analysis	Next Steps
Mixed Recycling Processing at Material Recovery Facilities (MRFs)	47%	1.173 million	12 to 59 new MRFs depending on facility throughput across the state for robust hub and spoke network	3 MRFs online or coming online in 2021 adding 79,000 additional tons per year in processing capacity	• What portion of commercial material can bypass a MRF and go straight to processors and end markets? • Where are smaller community MRFs preferable over larger scale 35- and 50-TPH MRFs?
Other Recycling at Recycling Drop-Off Facilities	34%	411,950	100 strategically placed comprehensive drop-offs would provide access to 98% of Michiganders, 17 sites in most densely populated areas provides access to half of Michigan's population		• What is the current drop-off diversion capacity in Michigan? • Where are opportunities to co-locate MRFs, transfer stations, landfills, and drop-offs?
Organics Processing	33%	1.012 million	Approximately 500,000 additional organics processing capacity for food waste and 300,000 additional processing capacity for wood waste.	5 additional organics processing sites began accepting food waste	• Where can new facilities be established? • What compost facilities have the potential to expand? • What compost facilities have the potential to accept food waste?

RECYCLING PROCESSING

18% recycling rate includes other recycling and composting

COG	Current MRF throughput TPY
1	227,600
2	0
3	0
4	9,200
5	0
6	41,600
7	33,280
8	91,860
9	402
10	30,750
11	2,122
12	4,014
13	0
14	0
Total	**440,828**



Source: https://www.nextcyclemichigan.com/mrfs-base-map

City of Lansing MRF

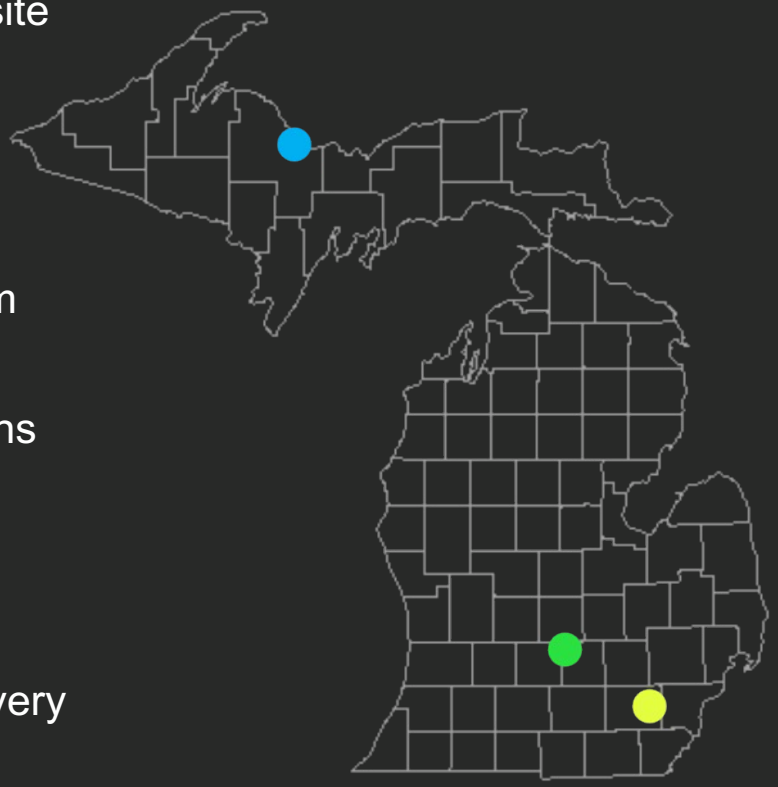
- Emterra Environmental, opened new MRF in April of 2021 built on a brownfields site
- 40,000 tons per year

Marquette MRF

- Funding from Closed Loop Partners and EGLE in 2019 to upgrade their MRF from dual stream to a single stream facility
- 9,000 tons per year with the potential to expand processing to 12,000 - 14,000 tons per year

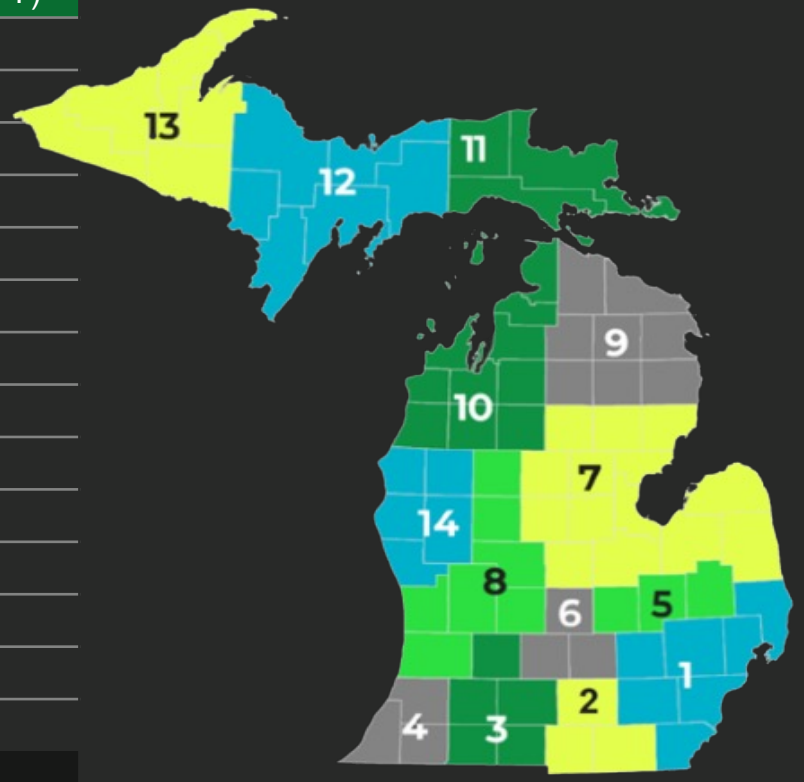
Recycling Ann Arbor MRF

- Raised over $7 million in capital to rebuild the City of Ann Arbor's Materials Recovery Facility (MRF)
- Processing 30,000 tons per year on a single shift; about 15 tons per hour



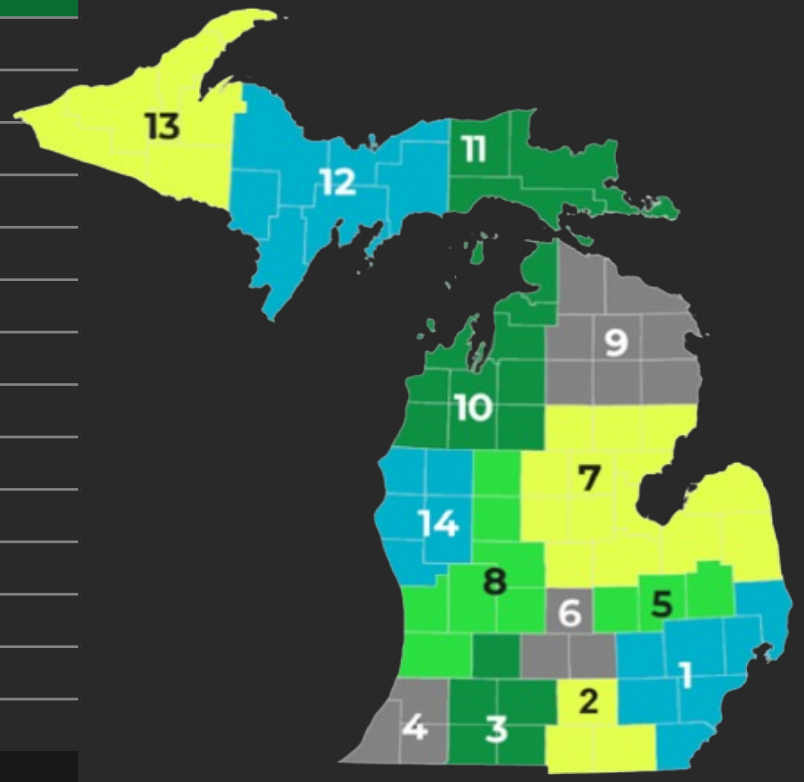
CURRENT VS. NEEDED MRF PROCESSING

COG	Current MRF Processing (TPY)	Needed MRF Processing (TPY)	MRF Processing Gap (TPY)
1	227,600	550,643	(323,043)
2	0	35,010	(35,010)
3	0	66,172	(66,172)
4	9,200	32,508	(23,308)
5	0	61,996	(61,996)
6	41,600	55,725	(14,125)
7	33,280	100,877	(67,597)
8	91,860	145,323	(53,463)
9	402	15,310	(14,908)
10	30,750	35,294	(4,544)
11	2,122	6,283	(4,161)
12	4,014	25,495	(21,481)
13	0	9,041	(9,041)
14	0	33,516	(33,516)
TOTAL	**440,828**	**1,173,193**	**(732,366)**



ADDITIONAL MIXED RECYCLABLES TO ACHIEVE 45% RECYCLING RATE

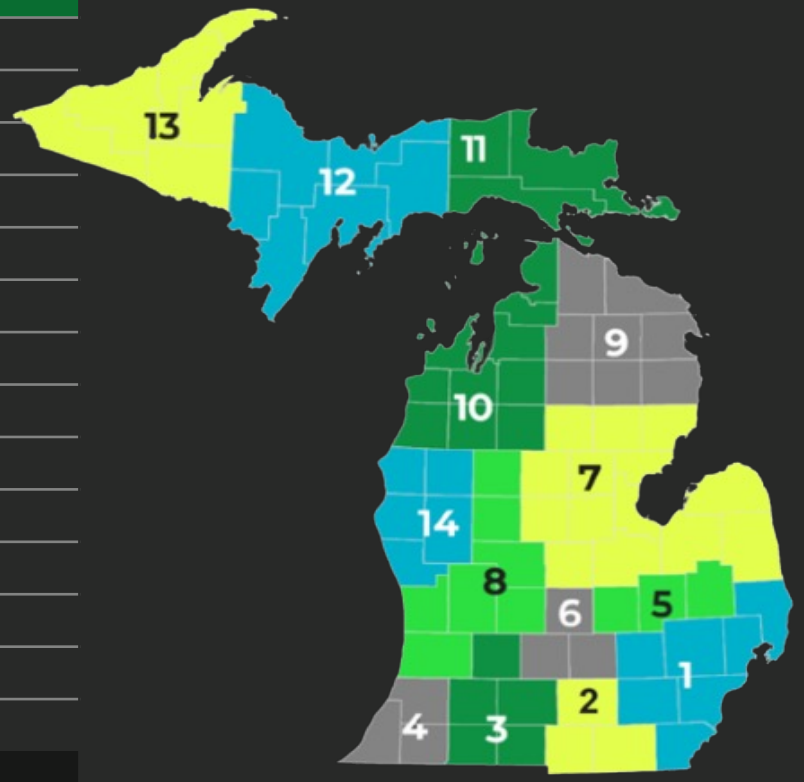
COG	Residential	Commercial & Institutional	Total
1	230,467	320,176	550,815
2	14,650	20,360	35,016
3	27,691	38,481	66,184
4	13,605	18,903	32,520
5	25,947	36,049	62,015
6	23,322	32,403	55,741
7	42,208	58,669	100,911
8	60,822	84,501	145,365
9	6,403	8,907	15,312
10	14,766	20,528	35,300
11	2,627	3,656	6,283
12	10,665	14,830	25,499
13	3,778	5,263	9,040
14	14,024	19,492	33,525
TOTAL	**490,975**	**682,218**	**1,173,526**



NEXTCYCLE MICHIGAN

ADDITIONAL MRF CAPACITY

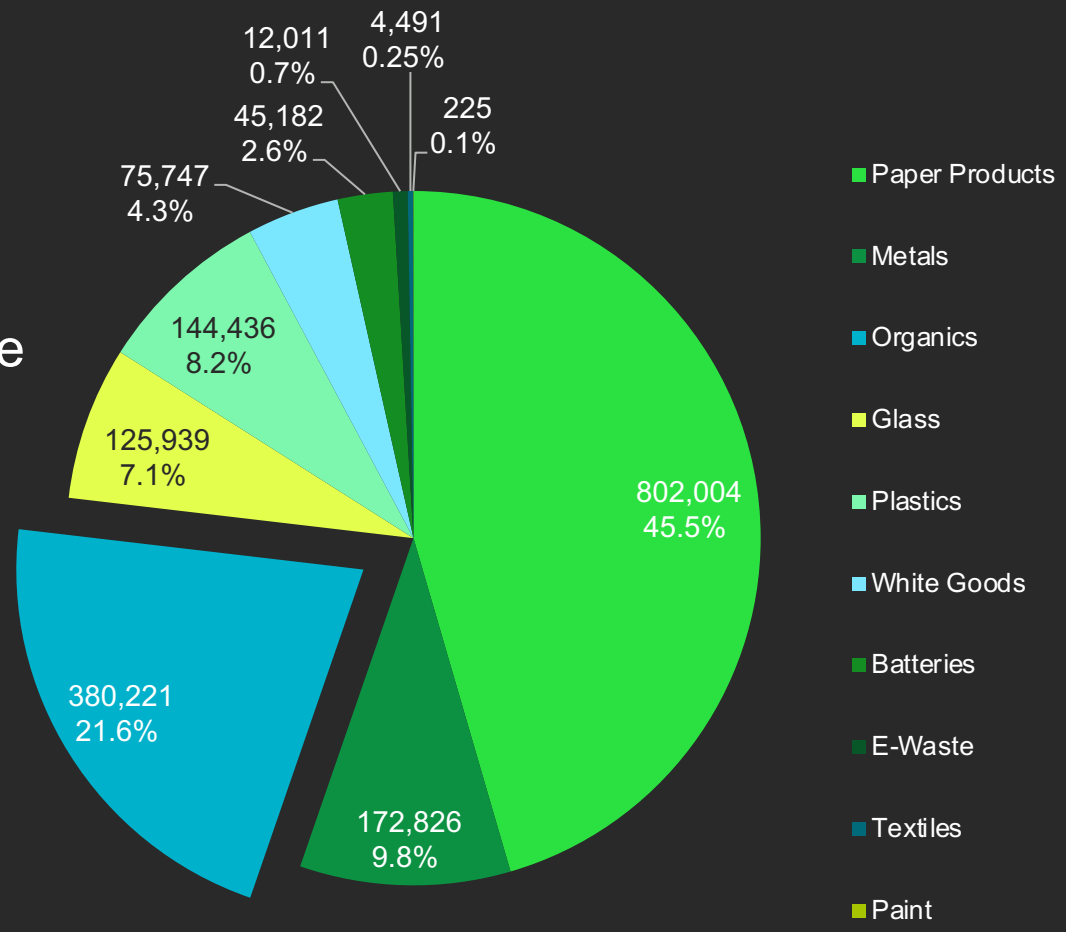
COG	10-TPH 1-SHIFT	35-TPH 1-SHIFT	50-TPH 1-SHIFT
1	28	8	6
2	2	0	0
3	3	1	1
4	2	0	0
5	3	1	1
6	3	1	1
7	5	1	1
8	7	2	1
9	1	0	0
10	2	0	0
11	0	0	0
12	1	0	0
13	0	0	0
14	2	1	0
TOTAL	**59**	**17**	**12**



ORGANICS RECOVERY IN MICHIGAN

2019 Michigan Recycling Rate is 18%

Organics make up **21.6%** of the recycled tonnage



Material Recycled by Category (Based on reviewed and adjusted 2019 reported data)

ORGANICS PROCESSING

Yard waste comprises **93%** of processed organics

Food waste comprises **1%** of processed organics

Year	Wood	Yard Waste	Food	Other Organics	Total
2018	11,540	339,685	3,848	12,125	**367,197**
2019	6,010	365,826	5,107	16,390	**393,333**

109 reporting facilities 2019. 10 accept food waste

62%

~393,333 tons of organics processed

7%

Food waste remains a large gap

33%

TONS OF ORGANICS PROCESSED AT MICHIGAN COMPOST FACILITIES IN 2019 BY COG

COG	Wood	Yard Waste	Food	Other Organics	Total
1	3,102	192,986	1,748	621	**198,457**
2	125	2,739	0	0	**2,864**
3	86	11,998	0	0	**12,084**
4	634	4,347	85	336	**5,402**
5	310	23,408	0	521	**24,239**
6	55	22,598	584	7,412	**30,649**
7	558	29,337	0	0	**29,894**
8	414	41,176	2,438	6,497	**50,526**
9	179	2,804	0	0	**2,983**
10	11	5,080	240	503	**5,833**
11	0	293	0	0	**293**
12	537	7,355	13	0	**7,905**
13	0	0	0	0	**0**
14	0	21,704	0	500	**22,204**
Total	**6,010**	**365,826**	**5,107**	**16,390**	**393,333**

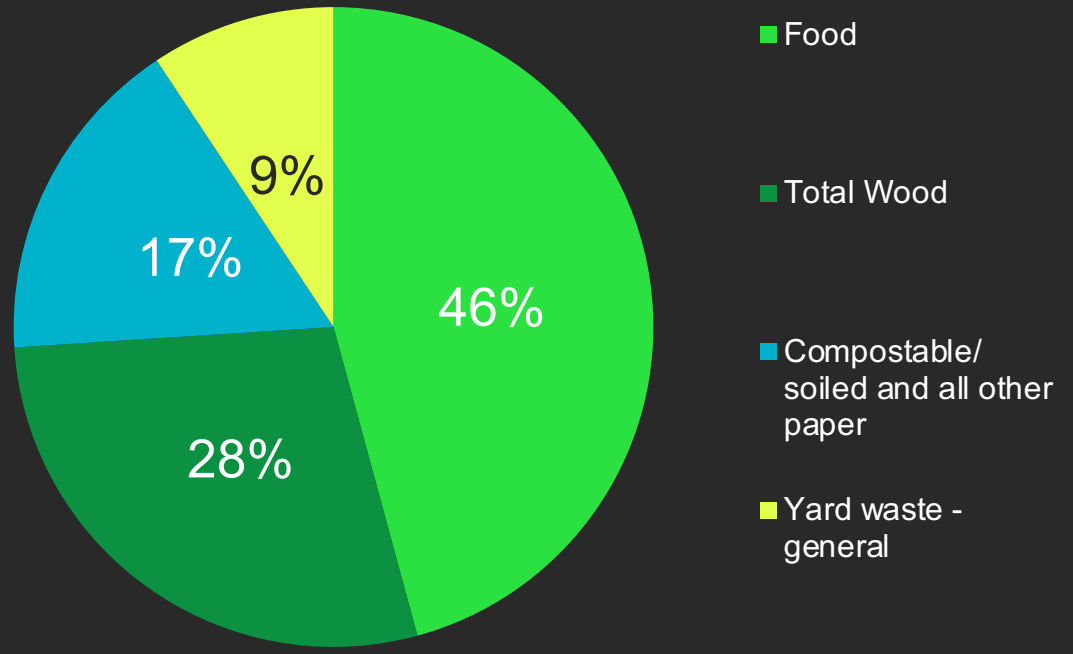
ADDITIONAL ORGANICS TARGETED FOR RECOVERY

To increase Michigan's recycling rate to 45%, approximately 33 percent of the organics currently going to disposal will need to be captured for organics processing at compost or anerobic digestion facilities, totaling over 1 million tons in the residential and commercial sectors

COG	Residential	Commercial	Total
1	241,096	234,174	475,270
2	15,335	14,894	30,229
3	28,981	28,149	57,130
4	14,240	13,831	28,071
5	27,151	26,372	53,523
6	24,405	23,703	48,108
7	44,200	42,933	87,133
8	63,645	61,814	125,459
9	6,721	6,524	13,245
10	15,475	15,033	30,508
11	2,760	2,679	5,439
12	11,178	10,855	22,033
13	3,974	3,861	7,835
14	14,684	14,265	28,949
Total Add'l Diversion	**513,845**	**499,087**	**1,012,932**

ADDITIONAL ORGANICS TARGETED FOR RECOVERY, CONTINUED

Material	Tons	Percent
Food	463,692	46%
Wood	285,660	28%
Compostable/soiled and all other paper	169,154	17%
Yard waste - general	94,426	9%
TOTAL	**1,012,932**	**100%**



46 percent of the estimated organics for potential recovery is food and food accounts for only 1 percent of the current organic's recovery in the state.

RECYCLING TAKE BACK AND DROP-OFF

Current collection methods for these items varies across Michigan and is often provided to residents as a patchwork of takeback programs, scrap yards, and government organized drop-off sites or events. To reach a 45 percent recycling rate, Michigan needs to capture an additional 412,000 tons of Other Recyclables that would need to be collected across Michigan

COG	Residential Additional Other Recyclables	Commercial Additional Other Recyclables	Total Additional Other Recyclables
1	85,844	107,683	193,527
2	5,454	6,840	12,294
3	10,307	12,931	23,238
4	5,063	6,354	11,417
5	9,661	12,123	21,784
6	8,682	10,897	19,579
7	15,703	19,709	35,412
8	22,648	28,410	51,058
9	2,370	2,984	5,354
10	5,481	6,890	12,371
11	973	1,225	2,198
12	3,963	4,978	8,941
13	1,398	1,758	3,156
14	5,215	6,548	11,763
Total Add'l Diversion	**182,762**	**229,330**	**412,092**

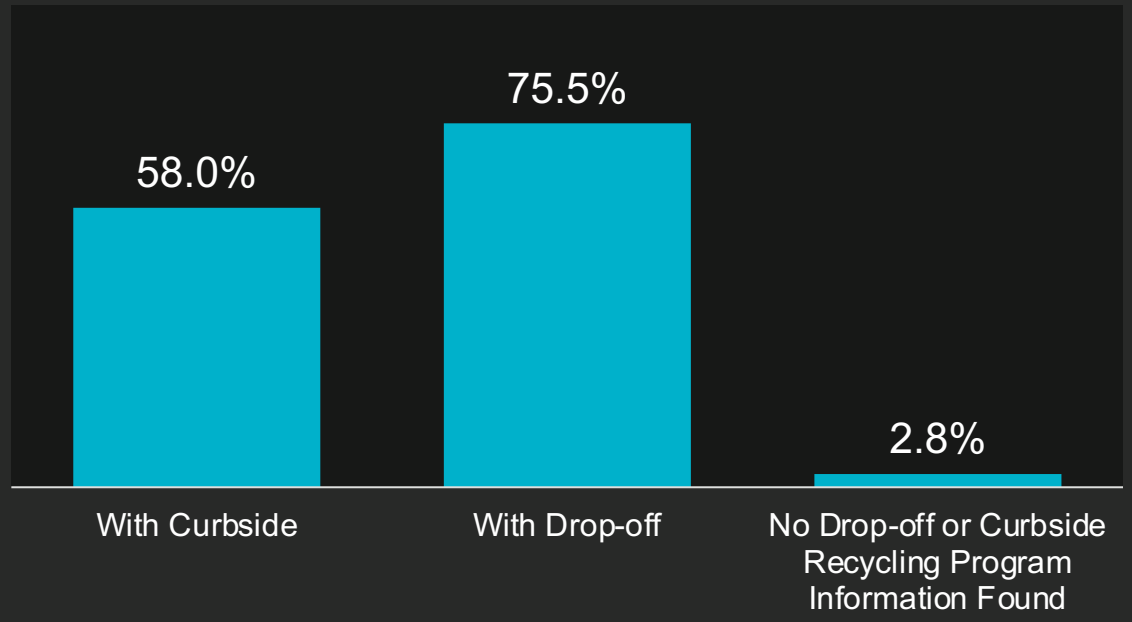
NEXTCYCLE MICHIGAN

DATA INFORMING THE 2021 GAP ANALYSIS UPDATE

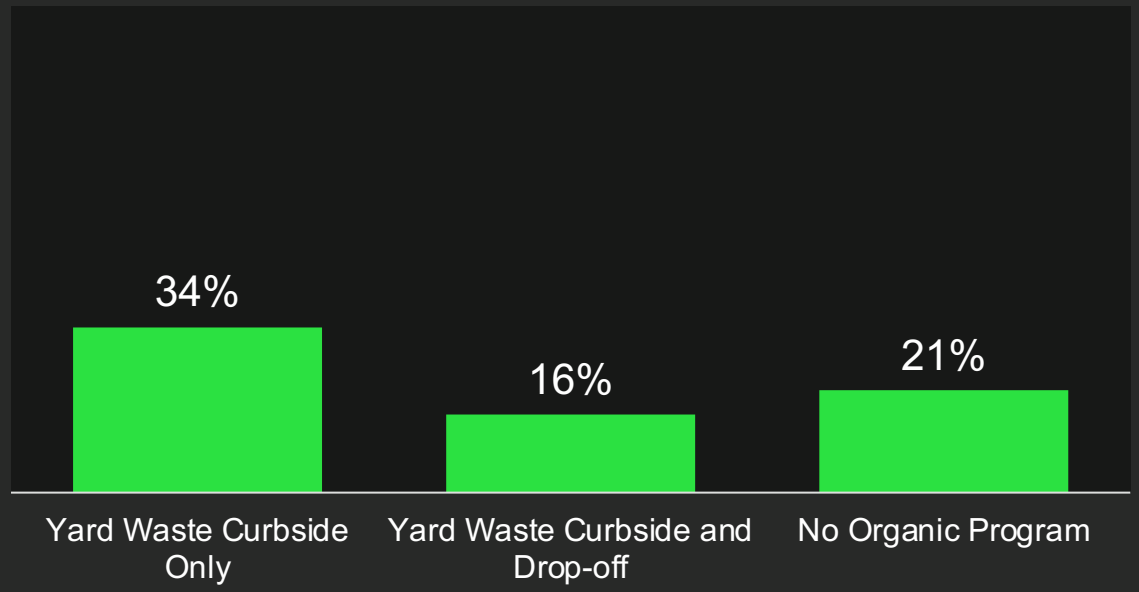
Community Program Communication Access

CURBSIDE AND DROP-OFF RECYCLING ACCESS

Percent of Michigan Households with Curbside and Drop-off **Recycling Access**



Percent of Michigan Households with Curbside and Drop-Off **Organics Collection**



METHODOLOGY

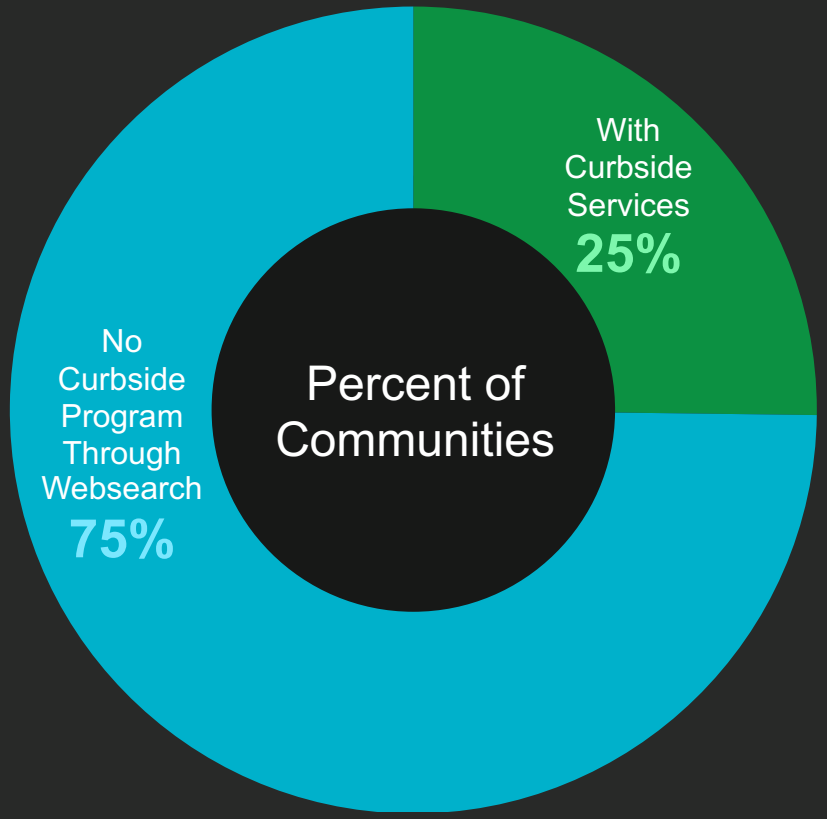
Curbside Program Communication

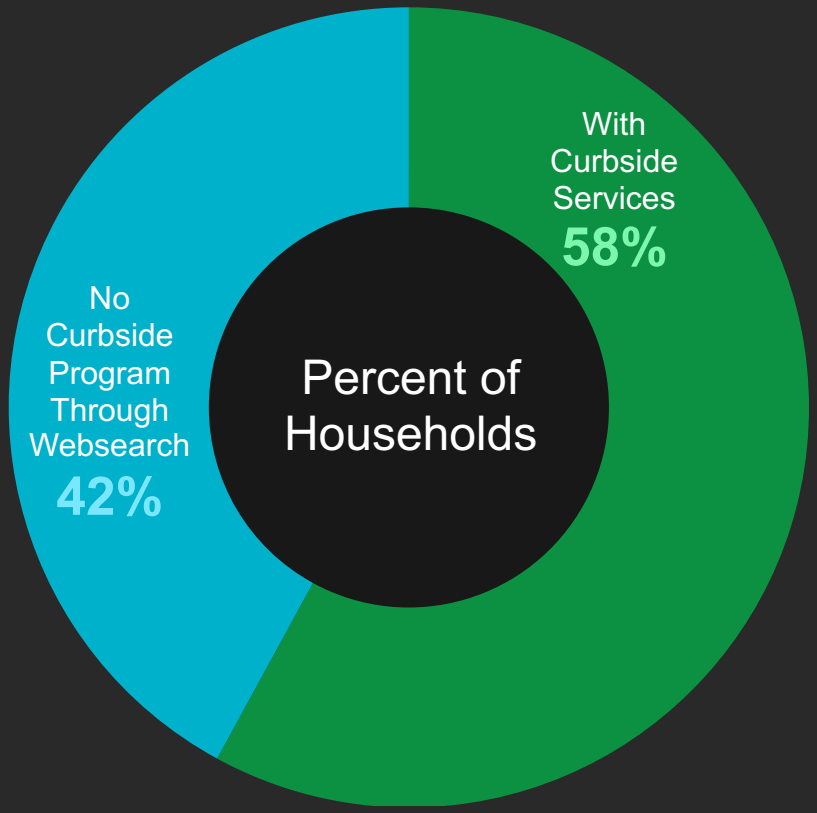
- Curbside recycling or organics collection options: municipal collection, contracted or franchised private waste hauler, or subscription service with a private waste hauler
- Typically available to single family and small multi-family homes up to 4 units

Drop-Off Program Communication

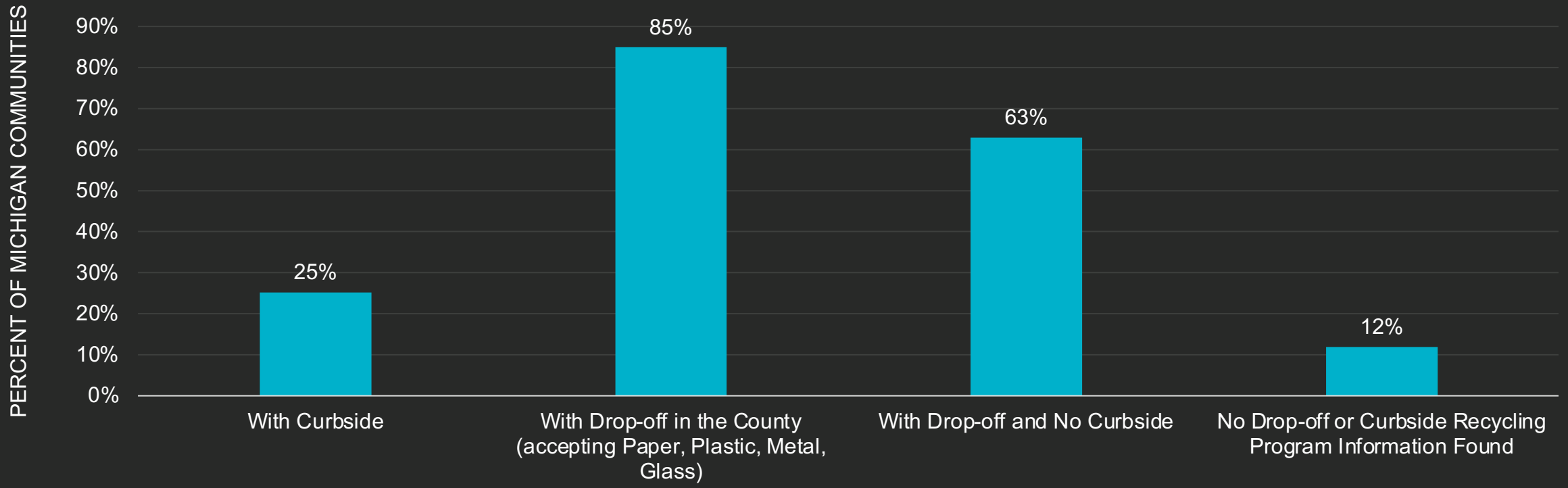
- Where residents can take collected material to a local drop-off point for a fee or free of charge
- Analysis is only tracking how drop-off recycling and organics programs are communicated to residents which again is the backbone of collecting material

CURBSIDE RECYCLING PROGRAMS

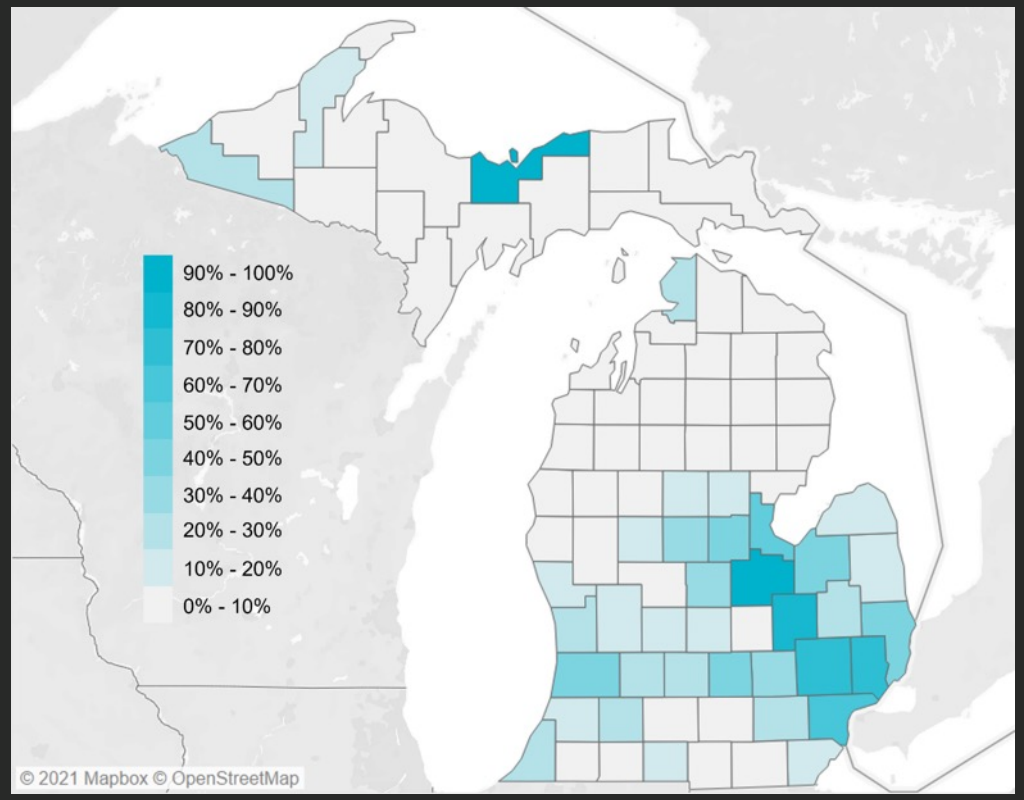




ACCESS TO RECYCLING PROGRAMS BY NUMBER OF COMMUNITIES

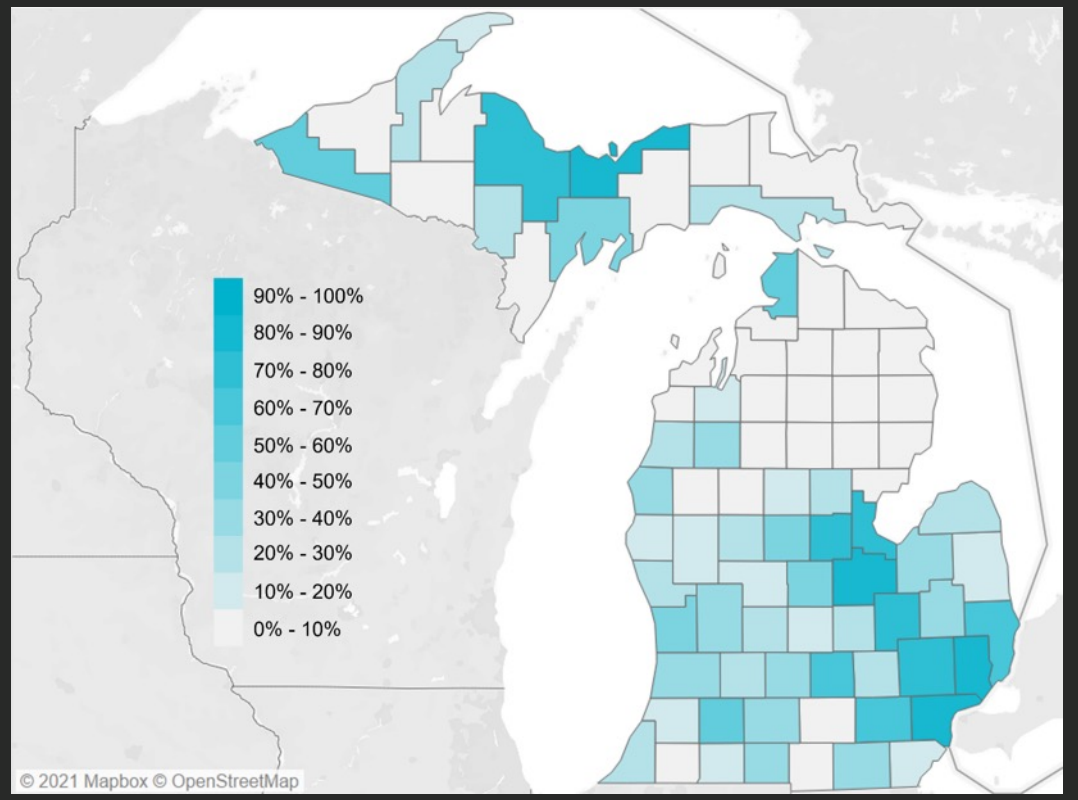


Percent of **Communities** with Curbside Recycling Access



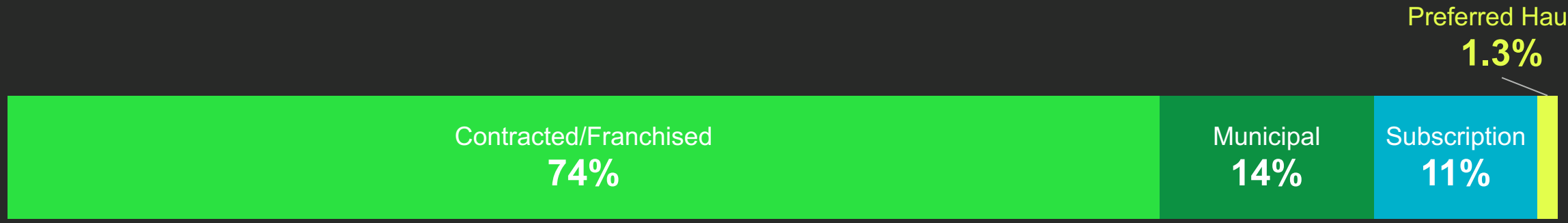
Includes access to paper, metal, plastic, and potentially glass
Source: https://nextcyclemichigan.com/communities-map

Percent of **Households** with Curbside Recycling Access



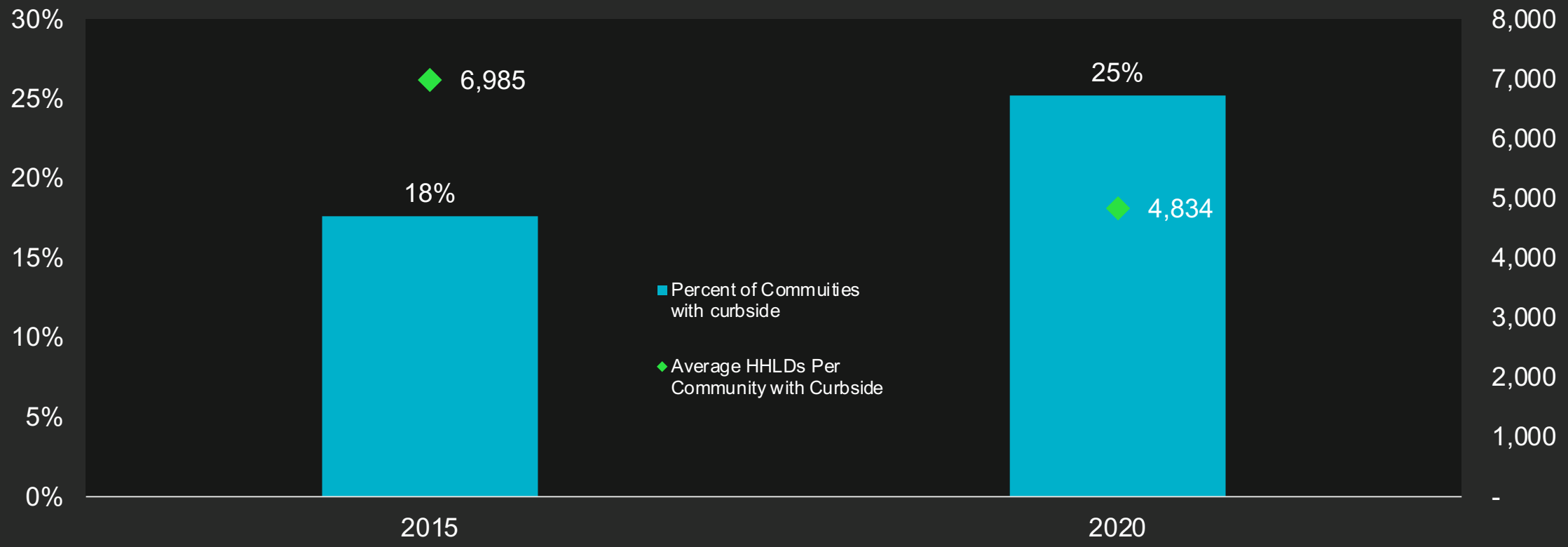
Source: https://nextcyclemichigan.com/communities-map

CURBSIDE ACCESS TYPE



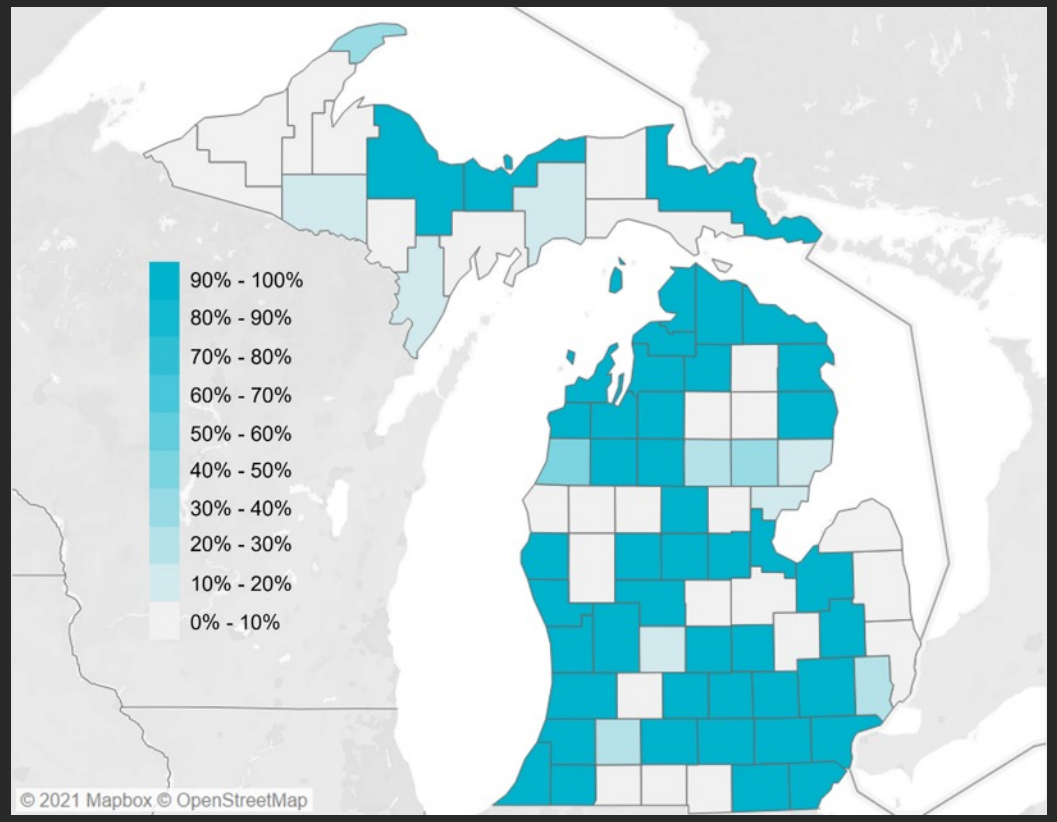
Contract Length	Average length is 5 years Contract lengths ranged from 1-year to “indefinite”
Pricing	The average contract price for garbage only service is $11.74 per month per household. The average contract price for garbage and recycling curbside service is $14.19 per month per household. The average contract price for garbage, recycling and yard waste curbside service is $13.65 per month per household.
Pick-up Frequency	Weekly curbside recycling collection is the most common service offering

2015 VS 2020 CURBSIDE ACCESS COMPARISON



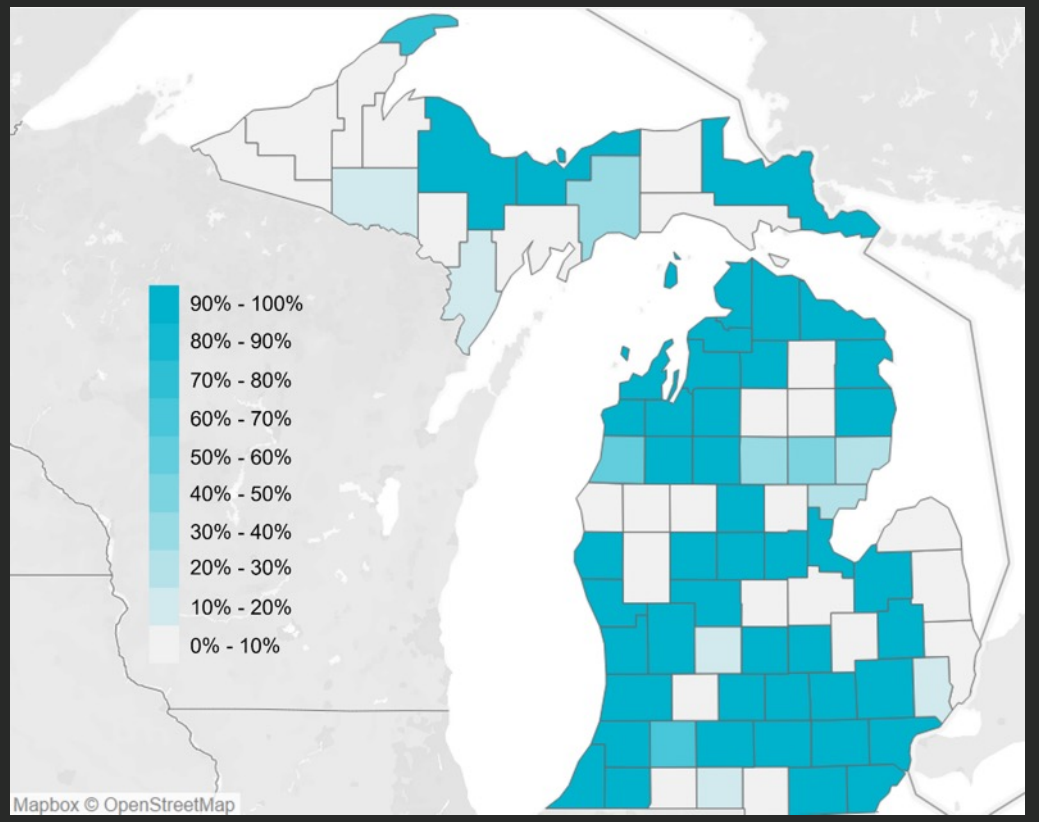
NEXTCYCLE MICHIGAN

Percent of **Communities** with Drop-off Recycling Access Somewhere in the County



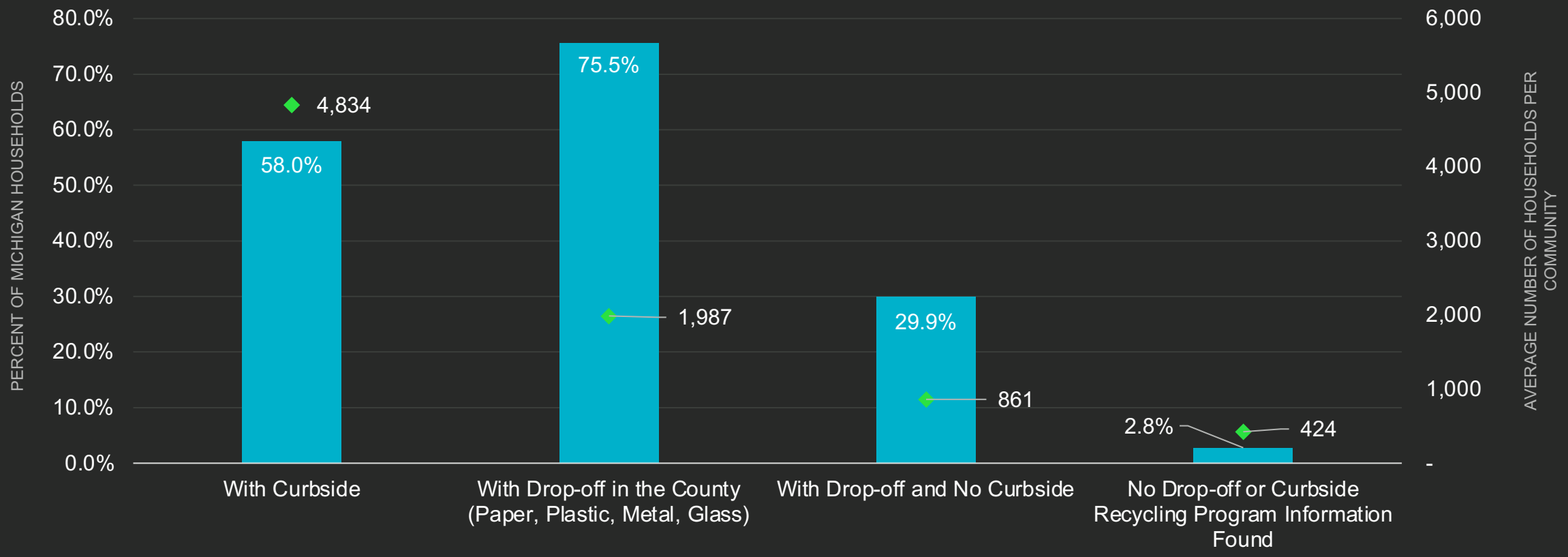
*Every community may not have convenient access to a dropoff that meets a standard such as distance to a dropoff, drive time to a dropoff, or a specified number of households per dropoff.
Source: https://nextcyclemichigan.com/communities-map

Percent of **Households** with Drop-off Recycling Access Somewhere in the County



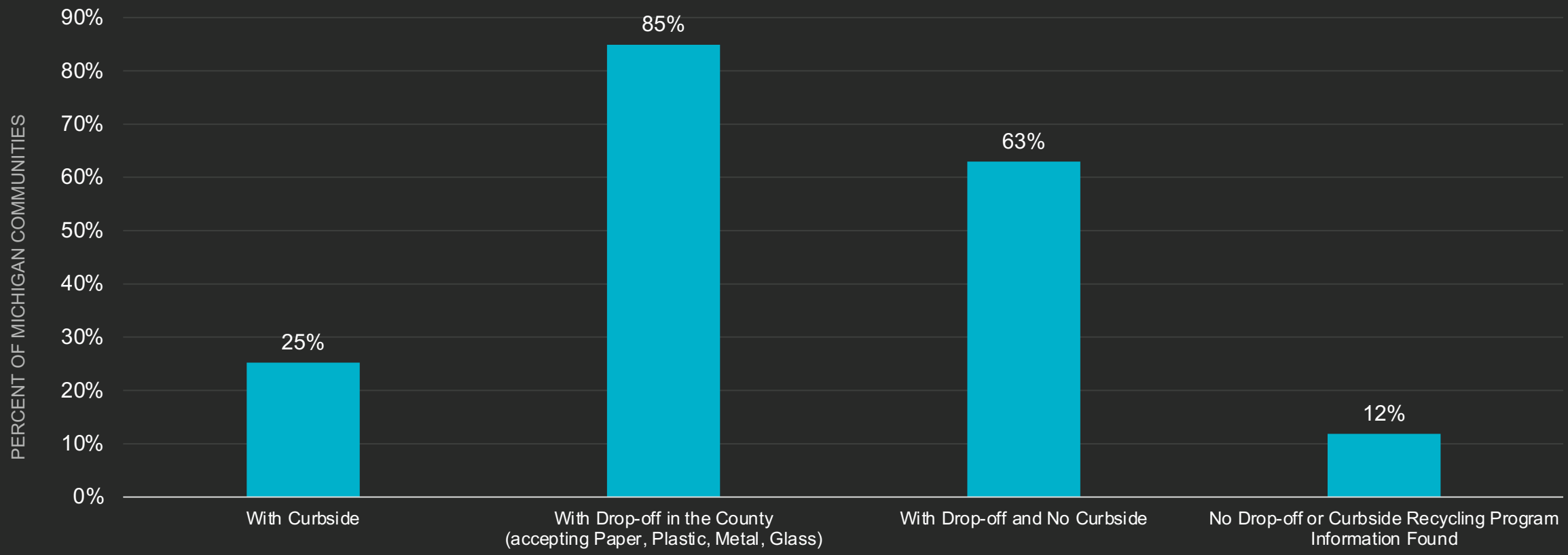
*Every community may not have convenient access to a dropoff that meets a standard such as distance to a dropoff, drive time to a dropoff, or a specified number of households per dropoff.
Source: https://nextcyclemichigan.com/communities-map

RECYCLING PROGRAMS COMPARED TO COMMUNITY SIZE

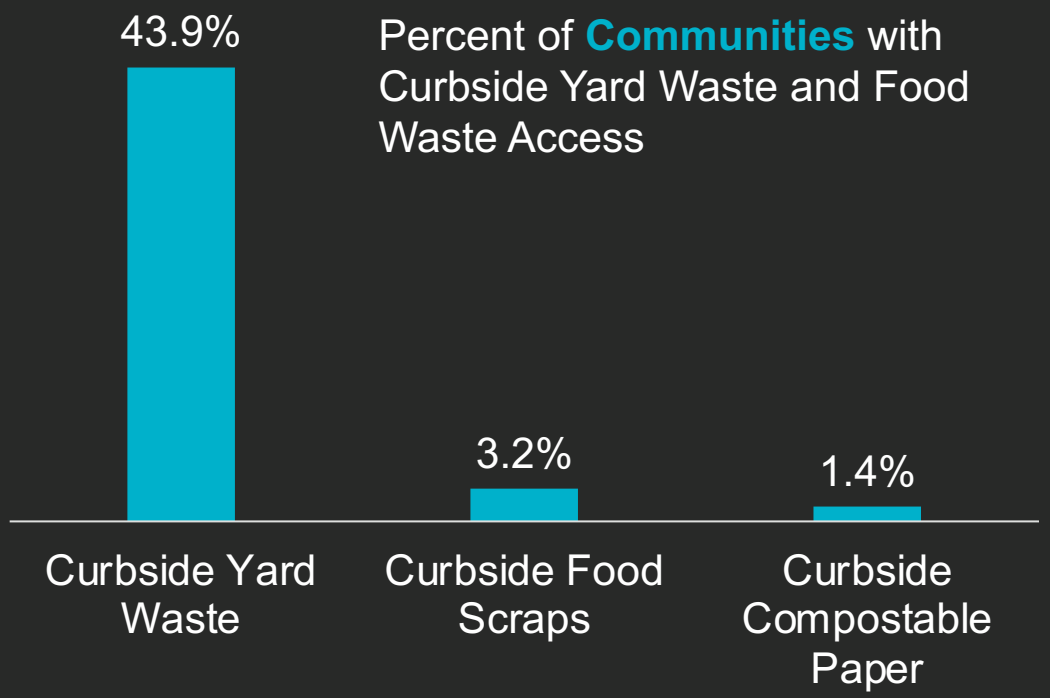


NEXTCYCLE MICHIGAN

ACCESS TO RECYCLING PROGRAMS BY NUMBER OF COMMUNITIES

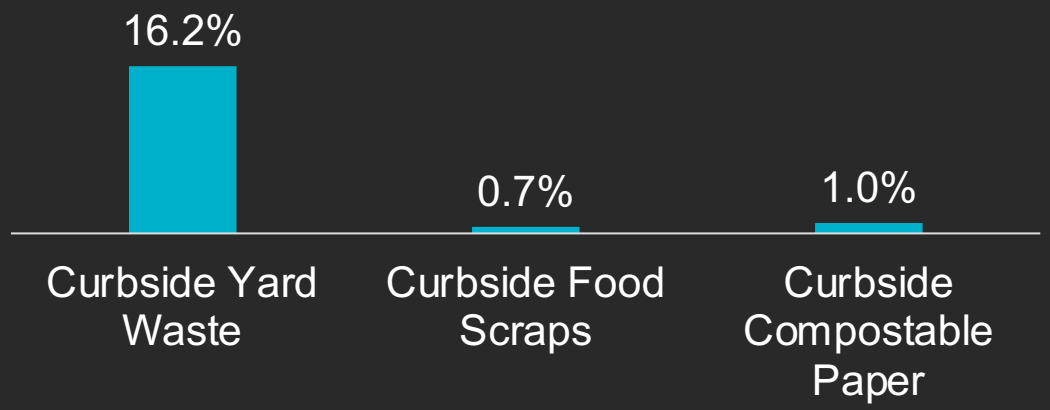


CURBSIDE YARD WASTE PROGRAM COMMUNICATION

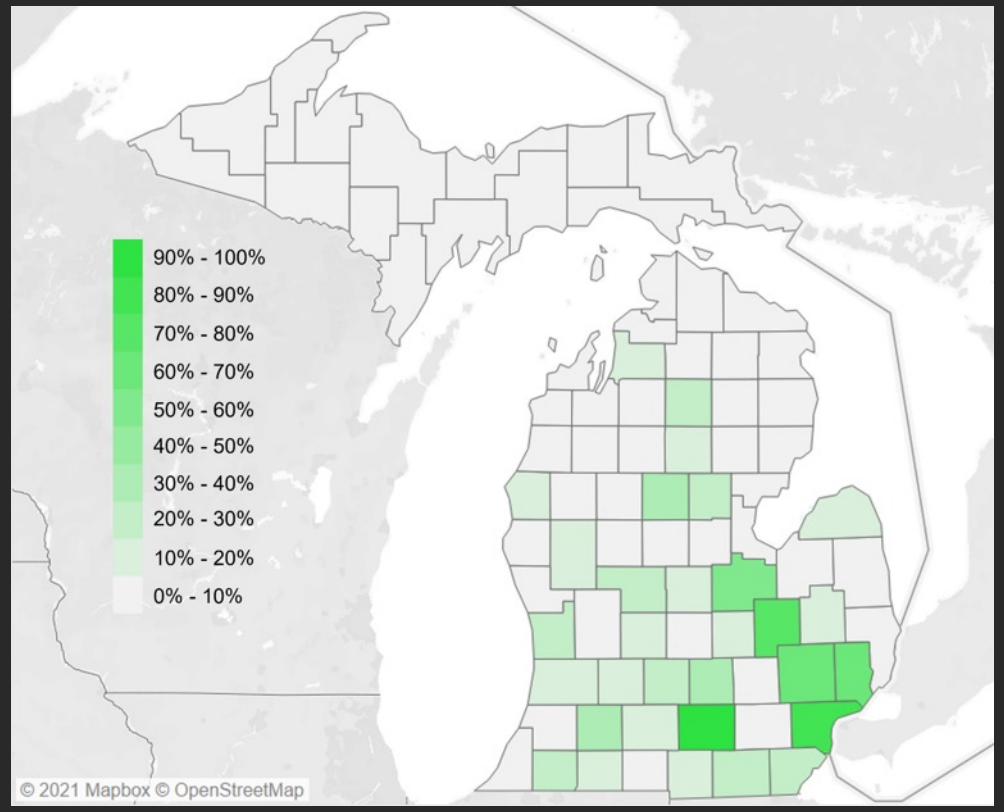


Percent of **Communities** with Curbside Yard Waste and Food Waste Access

Percent of **Households** with Curbside Yard Waste and Food Waste Access

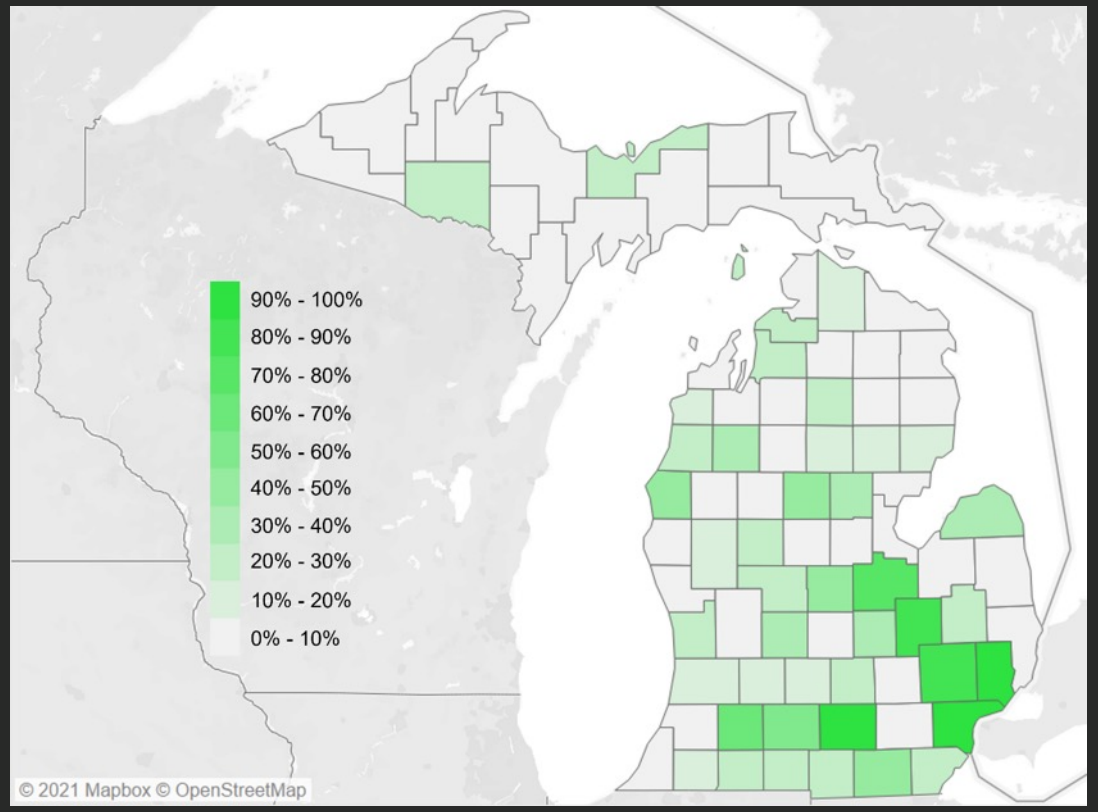


Percent of **Communities** with Curbside Yard Waste Collection Access



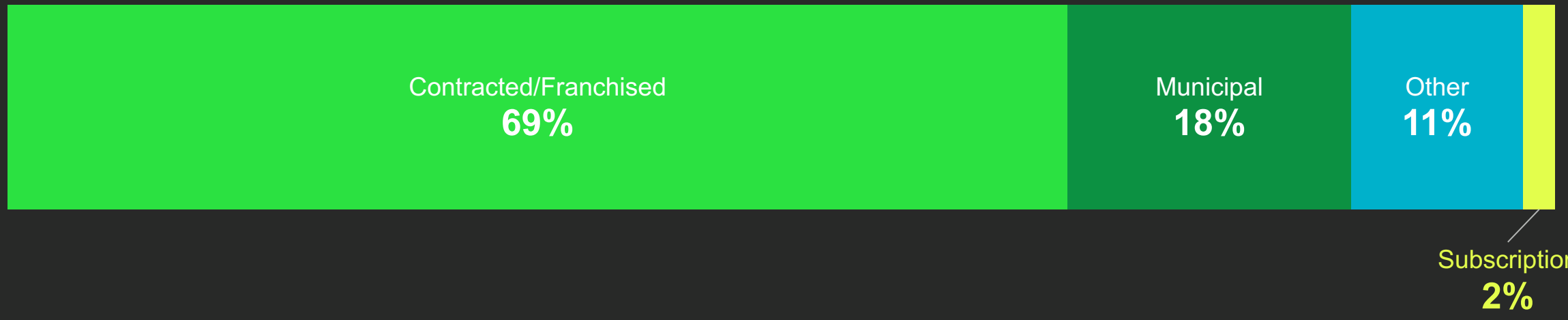
Source: https://nextcyclemichigan.com/communities-map

Percent of **Households** with Curbside Yard Waste Collection Access



Source: https://nextcyclemichigan.com/communities-map

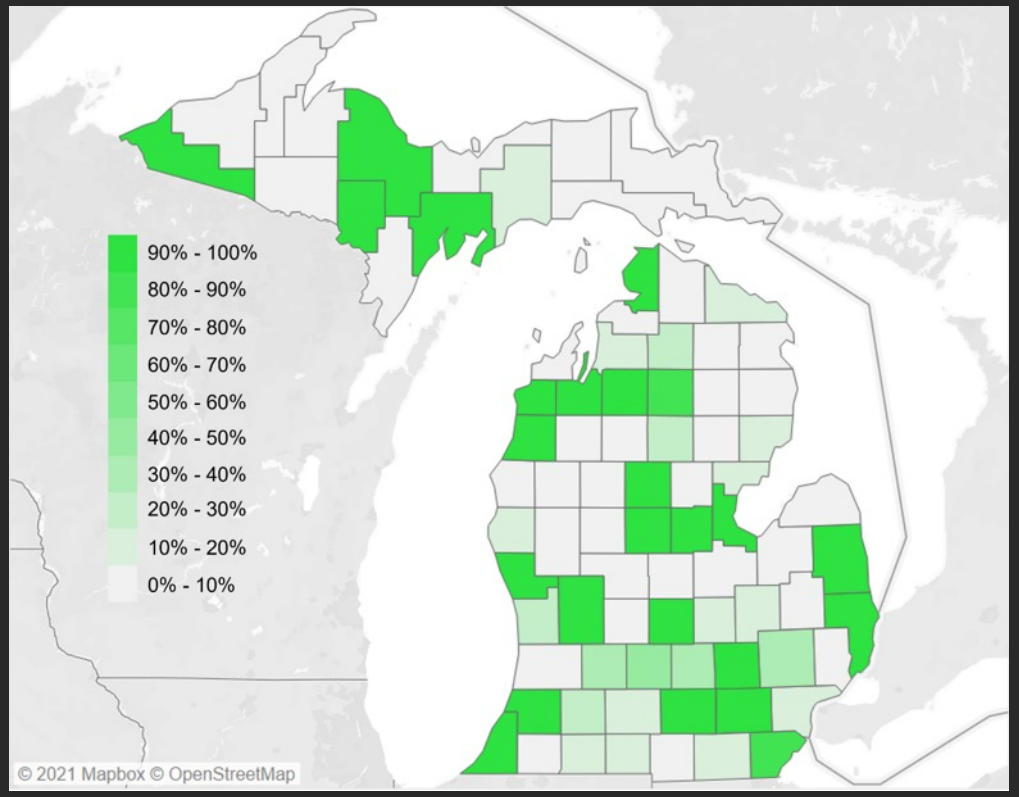
CURBSIDE YARD WASTE ACCESS TYPE



DROP-OFF YARD WASTE PROGRAM COMMUNICATION

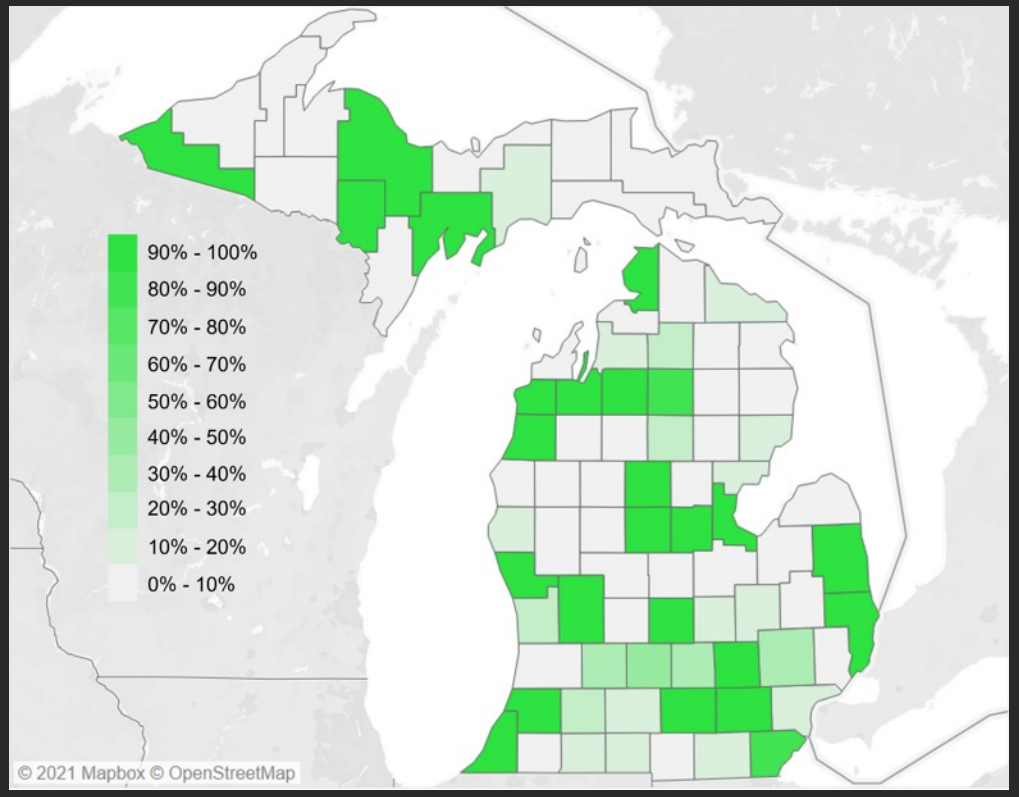
	Yard Waste Drop-off	Yard Waste Curbside and Drop-off	Yard Waste Drop-off Only	No Yard Waste Program
Percent of Communities	39%	6%	33%	51%
Number of Households	1,749,213	633,368	1,115,845	798,134
Percent of Total Households	45%	16%	29%	21%
Average Households Per Community	2,090	4,798	1,583	736

Percent of **Communities** with Drop-off Yard waste Access Somewhere in the County



Source: https://nextcyclemichigan.com/communities-map

Percent of **Households** with Drop-off Yard waste Access Somewhere in the County



Source: https://nextcyclemichigan.com/communities-map

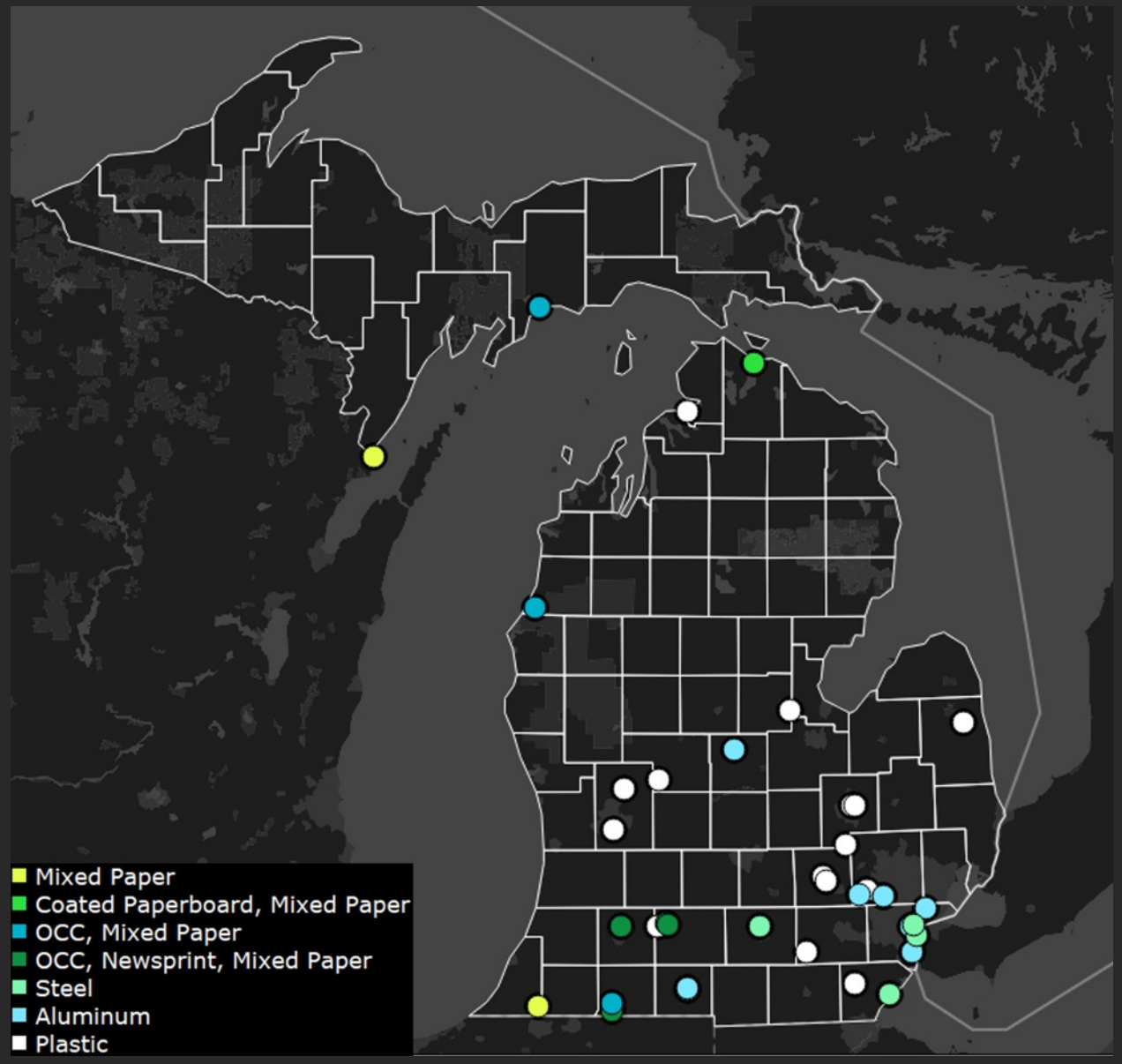
NEXTCYCLE MICHIGAN

DATA INFORMING THE 2021 GAP ANALYSIS UPDATE

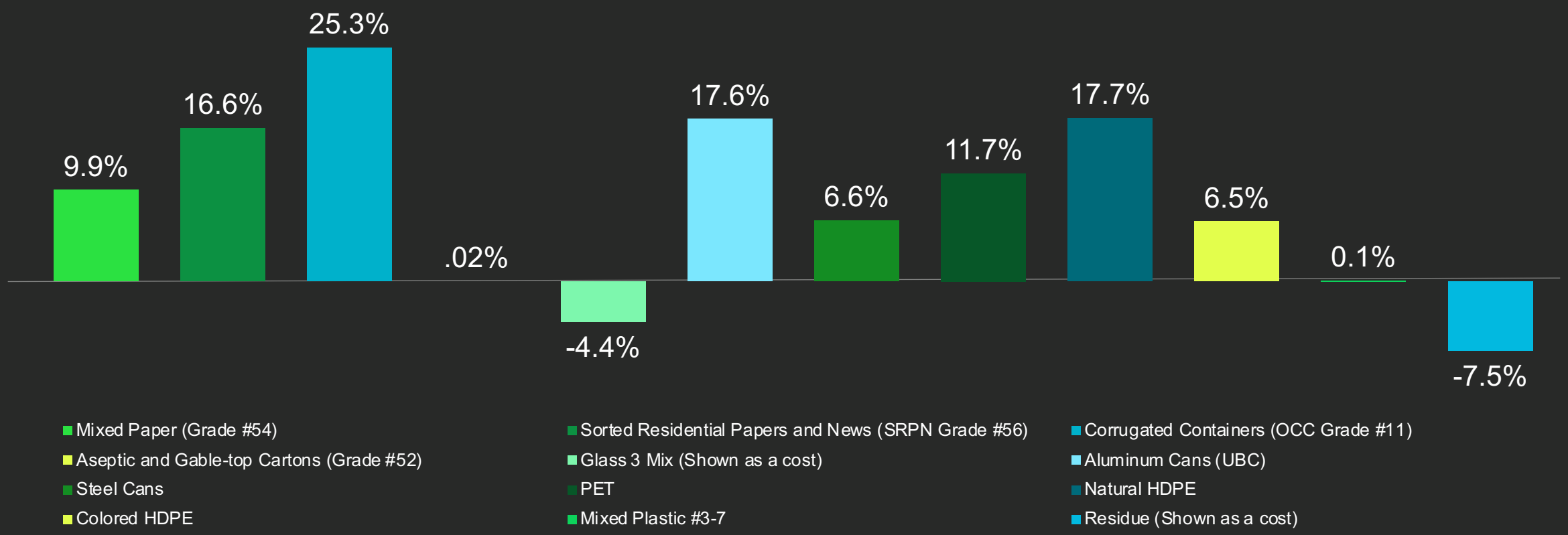
End Markets Update

MICHIGAN END MARKETS

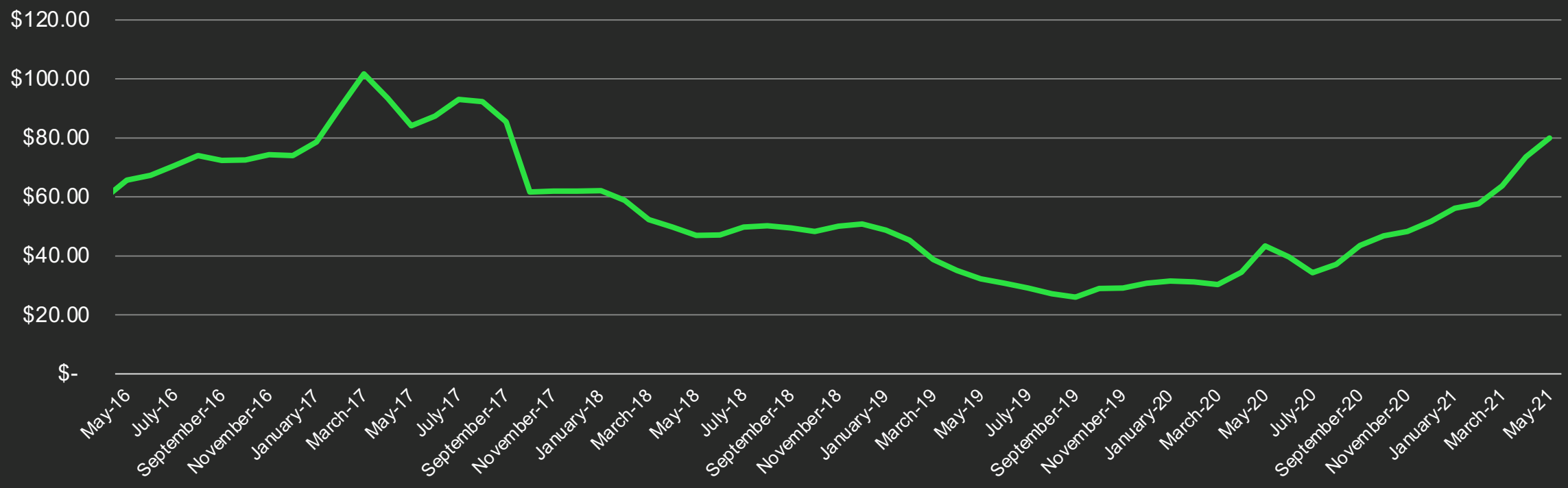
Michigan does not have any glass cullet plants or aluminum UBC plants



VALUE SHARE OF ACR BY COMMODITY



5 YEAR ACR PRICE



MATERIAL SUMMARY: PLASTIC TRENDS

Commodities	Long Term Forecast	Trend
Polyethylene Terephthalate (PET)	Increasing consumer demand due to the impact of the Covid 19 pandemic and the relaxation of business restrictions from pandemic contact protocols have driven an increase in demand rPET (recycled PET) should eventually delink market with virgin PET within 3 years, like NHDPE, and pricing will trend up.	Trends Up
Natural High-Density Polyethylene	Increasing demand due to the impact of pent-up consumer demand during the Covid 19 pandemic and the relaxation of business restrictions from pandemic contact protocols, CPG commitments and minimum recycled content policy expected to improve demand and NHDPE pricing should increase over the next 6-12 months.	Trends Up
Colored High-Density Polyethylene	New, virgin capacity natural gas cracking markets and Chinese polyethylene will keep CHDPE bale pricing low for the next 1-3 years. However, like NHDPE, long-term trend is emergence of a rCHDPE bale with higher demand with short term impacts related to increased consumer demand from relaxation of Covid 19 restrictions	Trend up
Mixed Plastic	#3-#7 bales will continue to trade at or below zero for the next 2-5 years. However, plastics industry is responding through chemical recycling initiative which deconstructs polymers. Megatrend will grow markets for mixed plastic.	Stay Low
Polypropylene	New virgin PP capacity and increasing upward pricing for oil / natural gas markets and increasing consumer demand will drive #5 bale pricing higher for the next 18 months.	Trend up
Mixed Bulky Rigids	Increase virgin capacity and increasing oil and natural gas prices and increased consumer demand will drive pricing slowly higher over the next 18 months.	Slight Increase

MATERIAL SUMMARY: PAPER TRENDS

Commodities	Long Term Forecast	Trend
Old Corrugated Cardboard (OCC)	OCC will have increased demand due to the impact of pent-up consumer demand during the Covid 19 pandemic. Market is increasing.	Slight Increases, Trend Stable
Mixed Paper	Market has rebounded from increasing demand with dwindling supply and domestic mill capacity increase.	Trend Up
Sorted Residential Papers and News (SRPN)	True mixed ONP (SRPN, #8 will have a differential of $20 or more compared to mixed paper because of lower contaminants from more sorting and because it can be used in groundwood applications.	Trend Up
Aseptic Packaging and Gable-Top Cartons	Cartons have maintained a positive value since the grade was tracked. Markets in Michigan are strong and regional mill process provide a high price premium for use in tissue production.	Trend up

MATERIAL SUMMARY: GLASS & METAL TRENDS

Commodities	Long Term Forecast	Trend
Glass 3 Mix Glass	3-mix glass has been disrupted by the COVID deposit return loss, which accounts for 33% to 50% of all cullet. At the same time, despite talk of recycled content, price will continue to trend lower, as construction slows (fiberglass usage) with the economy.	Trend Low
Aluminum Cans	Though aluminum cans have a home both for going back to can sheet or secondary aluminum pricing will continue to increase in the next 6-12 months.	Trend Up
Steel Cans	There is high demand for steel as factories ramp up production due to increasing consumer demand as the economy reopens after 14 months of pandemic restrictions and the announcement that China will limit steel exports. The value of steel has dramatically increased in the early part of 2021.	Trend up

MIXED PAPER (MP #54)

Market Size & Value

- 332,000 tons (approximately 60% of disposed material) has been targeted to be recovered to help the State reach a recycling rate of 45%
- Potential of additional recycled material being 282,000-381,000 tons
- $10.2 M-$12.2 M in value through recovery of MP

Current Market

- Steady market.
- Mills accustomed to the grade
- Mixed paper consumption is up 8% YOY. Price steady to dropping next 3-6 months due to mill outages
- Future better due to loss of feedstock from COVID changes.

Past Market Behavior

- Negative territory for almost 3 years
- Domestic mills did not have the cleaning equipment to use the new supply from MRFs
- Fiber of last resort
- Over a million tons of new capacity will come online in the next two years for this grade.

RRS Forecast/Recos

SHORT TERM: Outages planned in Shenyang, Nine Dragons, Midwest in next two months. MP may lose a bit

Movement better than before pandemic

LONG TERM: Malaysia, Vietnam and India inspections may dampen market as China presses

SORTED RESIDENTIAL PAPERS AND NEWS (SRPN #56)

Market Size & Value

- Over 132,400 tons (approximately 60% of disposed material) has been targeted to be recovered to help the State reach a recycling rate of 45%
- Potential of additional recycled material being 138,000-187,000 tons
- $11.2 M-$13.1M in value through recovery of SRPN

Current Market

- SRPN GRADE 56 is **up** 12%, averaging $48.44 per ton, compared with $43.13, good spot market premium of over $30 for specifications met. Mills are hungry for any clean paper.

Past Market Behavior

- Negative territory for almost 3 years
- After initial oversupply due to National Sword, demand has returned for SRPN and price is significantly more than mixed paper
- Market was shrinking for SRPN, and tissue and containerboard uses compete with paperboard because it is a cleaner MRF grade.

RRS Forecast/Recos

SHORT TERM: SRPN see price increases in coming months due to supply shortages and loss of commercial clean paper permanently due to COVID behavior shifts

LONG TERM: SRPN pricing has separated from mixed paper

Newspaper production to digital media continues

CARDBOARD (OCC #11)

Market Size & Value

- Approximately 60% of disposed material) has been targeted to be recovered
- Potential of additional recycled material estimated at 340.4 – 416.1K tons
- $55.6 M-$61.8M in value through recovery of OCC

Current Market

- Spot price in March 2021 still $20-60 higher than indexes
- Mills owned by China and in N. America counter with staged outages to slow price rise in next 3 months
- Latin America, U.S. and EU - mill buyer desperation
- Prices for the old, corrugated containers (OCC) have exceeded $300/MT in India
- WestRock findings on Pizza boxes

Past Market Behavior

- Function of the Economy
- Plastic Substitution slowing down growth of paper packaging
- Bellwether

RRS Forecast/Recos

SHORT TERM: Ocean Coasts

Counter-push against plastic packaging

Increased capacity through conversion in U.S., Mexico, Brazil, Canada

LONG TERM: China needs high quality

CAGR of 4.2% in next 5 years

ASEPTICS AND CARTONS (52)

Market Size & Value

- Approximately 25% of disposed material) has been targeted
- Potential of additional recycled material: 3.7 – 4.1K tons
- $297.6 K-$313.6K in value through recovery of cartons

Current Market

- Consumption and recycling of cartons has shown growth, but volumes are still low (~.5% by MRF volume)
- Limited MRFs sort as a separate grade
- Cartons have two facilities, Great Lakes Tissue and a Sustana, Que. and Sustana, Wisconsin tissue mills
- Cartons are an additive or a substitute for SOP in tissue mills

RRS Forecast/Recommendations

SHORT TERM: No pricing on RecyclingMarkets.net, spot somewhere near $20. Cartons (ISRI Grade #52) marketed to Great Lakes Tissue in Cheboygan, MI at a value of $175/ton.

Most MRFs sort cartons for MP now

LONG TERM: Polycoat grade (expanded Grade 52), will emerge in the next 3-5 years to ensure sort at MRFs is sustainable

SOP is generated from offices that are closed during stay-at-home orders, and mills are struggling for supply

Long strand fiber will be coveted as recycling grows worldwide

PET (#1)

Market Size & Value

- Bottle Grade PET makes up approximately 0.78% of material landfilled in Michigan, or 62.6K tons.
- Approximately 33.7K tons (50% of disposed material) has been targeted
- potential of additional recycled material being 30,000-37,000 tons
- $23.6 M-$25.3 M in value through recovery of PET

Current Market

- Best prices in two years but still low
- Virgin overproduction
- Companies still supportive of rPET in packaging
- Haulers and brands warm to regulatory prodding

Past Market Behavior

- Low-cost virgin resin historically had capped pricing on recycled PET
- PET recycling rate had been flat for the past 10 years at around 30%.
- Oversupply of virgin material

RRS Forecast/Recos

SHORT TERM: Best pricing since 2019, breaks $.10 per pound and is at pre-Covid levels.

Global warming and fire events have stabilized pricing and rPET demand.

Thermoform removal being pushed to MRFs

LONG TERM: Low-cost virgin PE oversupply will push market down but will see demand driven increase in rPET

HDPE (#2)

Market Size & Value

- HDPE makes up approximately .79%% of material landfilled in Michigan,
- Approximately 31,400 tons (50% of disposed material) has been targeted to be recovered to help the State reach a recycling rate of 45%
- Potential of additional recycled material being 25,500-37,200 tons
- $30.7M-$34.4M in value through recovery of HDPE

NATURAL HDPE

Current Market

- Strong domestic end markets in both Canada and U.S.
- Recycled content demand in single use plastics from CPG brands grows
- Domestic consumption has dominated
- Less and less available

RRS Forecast/Recommendations

SHORT TERM: Passed UBC as most valuable commodity in 2020- Record demand for most useable of post-consumer plastics

LONG TERM: NHDPE will remain at over-market value due to war on plastics, and push to recycled content

Low oil and natural gas prices will result in a glut of cheap virgin PE

COLORED HDPE

Current Market

- Price treaded water until recently
- B2B capability low
- Just so much lumber to go around
- Great recycling infrastructure present in N. America
- Resin price still dominates CHDPE behavior

RRS Forecast/Recommendations

SHORT + LONG TERM: Resin supply disruptions in Texas and Louisiana drive prices up for all grades

Plastics industry is responding through chemical recycling initiatives which deconstructs polymers

rCHDPE will eventually become more valuable for recycled content, if achieved

LOW DENSITY POLYETHYLENE (#4) FILM

Market Size & Value

- LDPE makes up approximately 5.11%% of material landfilled in Michigan,
- Estimated that over 195,800 tons (approximately 50% of disposed material) has been targeted to be recovered to help the State reach a recycling rate of 45%. Based on the average commodity value in the last 5 years, these lost resources (195,800 tons) have an annual value of roughly $90.1 million dollars, but based on commodity values in April 2020 was worth over $156.6 million dollars)
- Considering the current annual volume of LDPE landfilled (409,800 Tons) and current recovery of around 25,000 tons with potential of additional recycled material being 81,000-99,000 tons – combined recovery potential achieving 45% recycling rate is (25k+potential) = 201k-240k tons of LDPE recovered averaged 5-year commodity value of $460/ton resulting in (201k X $/ton) and (240k X $/ton) = range of $92M-$110 M in value through recovery of LDPE if the state recycling target of 45% recovery is achieved.

POLYPROPYLENE (#5)

Market Size & Value

- PP makes up approximately 0.21%% of material landfilled in Michigan, approximately 8,900 tons (35% of disposed material) has been targeted to be recovered to help the State reach a recycling rate of 45%. Based on the average commodity value in the last 5 years, these lost PP resources have an annual value of roughly $1.8 million dollars, but based on commodity values in April 2020 was worth over $6.1 million dollars)
- Considering the current annual volume of PP landfilled (23,300 Tons) and current recovery of around 5,100 tons with potential of additional recycled material being 8,000-9,900 tons – combined recovery potential achieving 45% recycling rate is (10.2k+potential) = 13.2K-15K tons of PP recovered averaged 5-year commodity value of $198/ton resulting in a range of $2.6 M-$3 M in value through recovery of PP if the state recycling target of 45% recovery is achieved.

Current Market

- Was an emerging grade with volatile demand.
- Market tracked with virgin PP and oil markets as a lower quality, low-cost substitute.
- Pricing was at historic low, but Pricing in SE tracks consistently higher than the national average due to high relative demand.

RRS Forecast/Recos

- New virgin PP capacity and low oil / natural gas markets will keep #5 bale pricing low for next 1-3 years.
- Expect low prices until clear rPP market emerges. New PP Recycling Coalition from The Recycling Partnership with big war chest will buoy positive feedback for this material.

ALUMINUM CANS (UBC)

Market Size & Value

- 332,000 tons (approximately 60% of disposed material) has been targeted to be recovered to help the State reach a recycling rate of 45%
- Potential of additional recycled material being 282,000-381,000 tons
- $10.2 M-$12.2 M in value through recovery of MP

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FUTURE DATA COLLECTION AND RESEARCH CONSIDERATIONS

DATA AND RESEARCH CONSIDERATIONS FOR FUTURE:

RECYCLING INFRASTRUCTURE & PROCESSING

- Recycling Infrastructure & Processing
- Update Hub & Spoke model
- Drop-offs & pre-processors network supply chain*
- MRF equipment and technology*
- Commercial recovery and processing
- Material commodity to end-markets supply chain research – incl. GHG reduction potential
- Recovery Data*
  - White goods, betteries, and electronics
  - Mattresses and bulky furniture
  - Textiles
  - Other commodities
- Drop-off and curbside access in accordance with Part 115 Benchmark Recycling Standards *
- Curbside program access and best practices for increasing recovery*

* Asterisked research and data areas can be informed by the Michigan Materials Management and Infrastructure Program Project (“MegaData” Project), Other areas identified have shown interest under the NextCycle Michigan Initiative and may be targeted through challenge track support or industry/stakeholder partner support.

DATA AND RESEARCH CONSIDERATIONS FOR FUTURE:

RECYCLING COLLECTION

Haulers and Collection Networks' data gathering and analysis

DATA AND RESEARCH CONSIDERATIONS FOR FUTURE:

ORGANICS INFRASTRUCTURE & PROCESSING

Organics Material Recovery opportunities

Compost Processing Capacity beyond EGLE registered sites

End markets and needs assessment for compost

DATA AND RESEARCH CONSIDERATIONS FOR FUTURE:

INDUSTRIAL RECOVERY & PROCESSING

Anaerobic Digestion Processing Capacity

EV, Solar, Wind Turbine Fiberglass

Waste materials for roads, road bases and pathways

DATA AND RESEARCH CONSIDERATIONS FOR FUTURE:

DIVERSITY, EQUITY, AND INCLUSION

Deeper dive into regional gaps for recycling and impact to underserved regions

Identify opportunity gaps within minority, women, immigrant, disabled and veteran-owned businesses

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WRAP UP

OVERVIEW

SUMMARY OF GAPS AND OPPORTUNITIES

- *Collection Programs*
- *Processing Capacity*
- *End Markets*
- *Program Investment*
- *Underserved Regions of the State*

OPPORTUNITIES FOR NCMI INITIATIVE

DATA INFORMING THE 2021 GAP ANALYSIS UPDATE

- *Recycling Rate Update*
- *Take Back Programs*
- *Investments Updates*
- *Infrastructure Updates and Potential Additional Recovery*
- *Community Program Communication Access*
- *End Markets Update*

FUTURE DATA COLLECTION AND RESEARCH CONSIDERATIONS

THANK YOU

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