P2 Recycling Grant: Waste and Recycling Waste Characterization and Commodity Values in Michigan

Michigan Recycling Coalition
May 5, 2016

Northeast Michigan Council of Governments
NEMCOG

RRS

Background

NEMCOG awarded 2014 P2 grant to:

- Identify metrics of successful recycling programs
- Highlight successful community recycling programs
- Calculate the economic and environmental impact of Michigan's recycling rate
- Develop a Waste Characterization of Landfilled Solid Waste

Partnered with PSC and RRS to conduct the work

Characterization of Landfilled Solid Waste

Methodology for Characterization Development

- Each study was assigned to a low, medium, or high diversion profile based on the characteristics of the states or communities represented in each study and the per capita amount of landfilled material
- Generic profiles for low, medium, and high diversion states and communities were developed.
- Profiles were adjusted to take into account overall drops in landfill tonnage in recent years as a result of the economic downturn and the changing material mix.
- Each profile consists of an estimate of per capita generation, and the composition of this material, as well as residential and commercial generation and composition from studies that included separate characterizations of those sectors

Characterization Studies Reviewed

Low- Diversion Profile
Pennsylvania, 2003
Illinois, 2009
Georgia, 2005
Indiana, 2012
US EPA, 2012

Medium - Diversion Profile
Wisconsin, 2003
Connecticut, 2010
California Integrated Waste Management Board, 2009
US EPA, 2012

High- Diversion Profile
Thurston County, WA, 2007
Snohomish County, WA, 2009
Clark County, WA, 2008
Seattle, WA Public Utilities, Residential- 2007;
Commercial - 2008
San Francisco, 2006
Palo Alto, CA, 2006
California Integrated Waste Management Board, 2009
US EPA, 2012

Additional Studies Consulted
Delaware, 2007
Iowa, 2011
Missouri, *2008*
Nebraska, 2009
Oregon, 2002
Vermont, 2002.

Percentage of Categories of Landfilled Materials

	Paper subtotal	Plastic subtotal	Metal subtotal	Glass Subtotal	Electronics Subtotal	Total Wood	Organic Subtotal	Auto related Oil, Tires, batteries)	Household Items (Carpet, Textile, Bulbs)	OTHER NON-RECYCLABLE MATERIAL
Low Diversion	32.69%	13.88%	5.33%	3.28%	2.23%	8.67%	20.79%	0.16%	6.10%	6.87%
Medium Diversion	21.30%	11.63%	4.93%	2.00%	2.50%	11.87%	23.90%	0.27%	5.93%	15.67%
Low Diversion GL Residential	26.72%	15.92%	7.48%	2.51%	2.40%	11.90%	20.07%	0.37%	6.32%	6.33%
Medium Diversion GL Residential	34.12%	14.79%	4.68%	3.45%	2.10%	6.85%	18.78%	0.30%	3.99%	10.95%
Bottle Bill Diversion	22.81%	12.11%	5.85%	1.73%	1.56%	10.17%	24.39%	0.05%	5.18%	16.17%
Final Diversion Rate	**23.69%**	**12.58%**	**6.08%**	**1.79%**	**1.62%**	**10.57%**	**21.30%**	**0.05%**	**5.37%**	**16.95%**

Selected Categories of Landfilled Materials

Material Type	Current Diversion and Recovery	Estimated Material Landfilled
High Grade - general with White and Colored Ledger	4,849	114,234
Mixed/ unspecified Office	32,792	56,492
Low Grade - general (OMG), Boxboard, Paper Bags, Phonebooks other recyclables	193,055	447,557
ONP	55,699	154,466
OCC	140,265	455,686
Cartons, Aseptics and Poly-coated	26,233	11,257
Compostable/ soiled and all other paper		661,642
Paper Subtotal	**452,893**	**1,901,543**
PET bottles and containers	5,742	54,616
HDPE Bottles Natural & Colored	5,076	44,818
Plastic bottles and #3-7 (general)	2,153	25,015
All other Plastics and Packaging, LDPE, Polystyrene (foam), Durable and Rigid containers and PP tubs)	58,172	885,107
Plastic Subtotal	**71,143**	**1,009,556**

Comparison to WMSBF Waste Characterization

Material	RRS	WMSBF	Difference	Material	RRS	WMSBF	Difference
Mixed Paper	14.40%	12.07%	2.33%	Food Waste	15.10%	13.57%	1.53%
Newsprint	1.92%	1.22%	0.70%	Wood	6.65%	5.19%	1.46%
Corrugated	7.37%	8.42%	-1.05%	Other Organics	7.63%	9.05%	-1.42%
Plastic	3.60%	4.10%	-0.50%	Ferrous	3.96%	3.32%	0.64%
Plastic Bags	2.38%	2.77%	-0.39%	Aluminum	0.30%	0.43%	-0.13%
Plastic Packaging	4.66%	5.50%	-0.84%	Glass	1.79%	2.15%	-0.36%
PET Beverage	0.68%	0.94%	-0.26%	Other Inorganics	14.95%	14.65%	0.30%
MI Deposit	0.31%	0.29%	0.02%	Textiles	2.98%	3.65%	-0.67%
Polystryrene	0.94%	0.71%	0.23%	Bulk Items	1.44%	1.20%	0.24%
Yard Waste	3.14%	5.00%	-1.86%	Electronics	1.62%	2.49%	-0.87%
Soil	3.06%	2.36%	0.70%	Household Haz	1.10%	0.93%	0.17%

Findings for Waste Characterization

Measuring the composition of disposed wastes in total and by generator sector is dependent on the following guidelines that should be considered for implementation by the State of Michigan

- Well Defined Goal and Objective - Waste composition is changing rapidly – the "Evolving Ton" – so know what you want to achieve
- Defined waste categories that are consistent with other states in the region to allow for comparison – data on up to 80 categories of materials have been collected;
- Targeted generator sampling of the most prevalent commercial business types (e.g., grocery stores, manufacturing, retail malls, etc.) that generate significant quantities of waste;
- Enhanced research into waste generation indicators for certain waste streams, especially C&D debris, to improve future sampling plans for this waste stream;
- Measuring contamination rates in disposed material (for both particulate matter and moisture) as a means of investigating MRF processing potential;
- Calculating energy and heating values in disposed waste for incineration and thermal conversion processes;
- Determining the composition of residuals from recyclables processing facilities to test recovery efficiency and potential for additional processing.

If Michigan determines that large statewide waste characterization studies should be conducted, it may consider integrating one or more of these tests in the future.

Recycling Commodity Value

Value of Landfilled Recyclables

Current Average Commodity Value = $73/ton Oct. 2015

CURRENT RECYCLED COMMODITY	TONS	Percent of Total	5 YEAR Average $/TON	5 YEAR VALUE	OCTOBER 2015 VALUE	CURRENT VALUE
Soft Mixed Paper	401,884	32.9%	$62.83	$25,248,349	$42.50	$17,080,061
Special De-ink Quality News (ONP)	100,403	8.2%	$82.92	$8,325,098	$57.50	$5,773,184
Corrugated Containers (OCC)	296,196	24.3%	$112.50	$33,322,073	$77.50	$22,955,206
Aseptic Cartons	7,317	0.6%	$49.37	$361,208	$113.75	$832,290
Glass 3 Mix	93,493	7.7%	-$3.53	-$330,341	-$11.50	-$1,075,168
Aluminum Cans (Sorted, Baled)	8,943	0.7%	$1,539.00	$13,762,961	$1,090.00	$9,747,646
Steel Cans (Sorted, Densified)	232,242	19.0%	$113.29	$26,311,046	$90.00	$20,901,751
PET (Baled, picked up)	35,500	2.9%	$420.29	$14,920,491	$210.00	$7,455,039
Natural HDPE (Bailed, picked up)	4,065	0.3%	$708.40	$2,879,580	$520.00	$2,113,752
Colored HDPE (Bailed, picked up)	25,067	2.1%	$486.67	$12,199,237	$360.00	$9,024,093
Comingled #3-7, (Baled, picked up)	16,260	1.3%	$1.96	$31,923	$50.00	$812,981
TOTAL of Current Recyclables	1,221,369	100.0%		$137,031,626		$95,620,835

Value of Landfilled Recyclables

Current Value = $73/ton Oct. 2015

CURRENT RECYCLED COMMODITY	TONS	5 YEAR Average $/TON	5 YEAR VALUE	OCTOBER 2015 VALUE	CUURENT VALUE
OTHER MATERIAL					
C&D Wood	551,201	$15.00	$8,268,020	$15.00	$8,268,020
Textiles	155,279	$4.00	$621,118	$4.00	$621,118
Computers	23,576	$500.00	$11,788,230	$125.00	$2,947,057
LDPE (includes some bags, film)	248,637	$278.00	$69,121,030	$120.00	$29,836,416
Durable and Rigid containers (HDPE Rigid (Baled)	89,834	$332.00	$29,825,034	$310.00	$27,848,676
TOTAL Other MATERIAL	517,327		$111,355,411		$61,253,267
TOTAL	1,738,696		$248,387,037		$156,874,102

Value of Current Recycling

Current Value = $73/ton Oct. 2015

CURRENT RECYCLED COMMODITY	TONS	Percent of Total	5 YEAR Average $/TON	5 YEAR VALUE	OCTOBER 2015 VALUE	CUURENT VALUE
Soft Mixed Paper	225,875	25.7%	$62.83	$14,190,625	$42.50	$9,599,707
Special De-ink Quality News (ONP)	56,431	6.4%	$82.92	$4,679,053	$57.50	$3,244,770
Corrugated Containers (OCC)	166,475	18.9%	$112.50	$18,728,396	$77.50	$12,901,784
Aseptic Cartons	4,112	0.5%	$49.37	$203,014	$113.75	$467,782
Glass 3 Mix	182,685	20.8%	-$3.53	-$645,488	-$11.50	-$2,100,882
Aluminum Cans (Sorted, Baled)	6,394	0.7%	$1,539.00	$9,840,093	$1,090.00	$6,969,267
Steel Cans (Sorted, Densified)	166,046	18.9%	$113.29	$18,811,587	$90.00	$14,944,107
PET (Baled, picked up)	31,222	3.6%	$420.29	$13,122,306	$210.00	$6,556,574
Natural HDPE (Bailed, picked up)	3,575	0.4%	$708.40	$2,532,539	$520.00	$1,859,007
Colored HDPE (Bailed, picked up)	22,046	2.5%	$486.67	$10,729,011	$360.00	$7,936,529
Comingled #3-7, (Baled, picked up)	14,300	1.6%	$1.96	$28,076	$50.00	$715,003
TOTAL of Current Recyclables	879,161	100.0%	$104.89	$92,219,212	$71.77	$63,093,646

Value of Current Recycling
Other Material

RECYCLED COMMODITY	TONS	5 YEAR Average $/TON	5 YEAR VALUE	OCTOBER 2015 VALUE	CUURENT VALUE
OTHER MATERIAL					
Organics	378,097	$15.00	$5,671,462	$15.00	$5,671,462
Textiles	29,850	$4.00	$119,400	$2.25	$67,163
Computers	24,548	$500.00	$12,274,170	$350.00	$8,591,919
Paint	225	-$12.00	-$2,700	$0.00	$0
Tires	56,960	-$10.00	-$569,602	-$10.00	-$569,602
Batteries	45,187	$0.00	$0	$0.00	$0
TOTAL Other MATERIAL	534,868		$17,492,730		$13,760,942
TOTAL	1,414,029		$109,711,942		$76,854,588
Avoided Landfill Disposal					
Recycled Material	879,161	$35.00		$35.00	$30,770,630
Other Recovered Material	534,868	$35.00		$35.00	$18,720,381

Jobs Created by Recycling

Types of Operation	Jobs per 10,000 TPY
Computer Reuse	296
Textile Reclamation	85
Misc. Durables Reuse	62
Wooden Pallet Repair	28
Recycling-based Manufacturers	25
Paper Mills	18
Glass Product Manufacturers	26
Plastic Product Manufacturers	93
Conventional Materials Recovery	10
Composting	4
Landfill & Incineration	1

Economic Development Impact per 10,000 tons of additional diversion	
(single-stream material)	
Capital Investment[1]	
Collection Trucks	$281,250
Carts	$500,000
MRF Infrastructure	$400,000
	$1,181,250
Market Efficiencies[2]	
Avoided Disposal	$350,000
Material Value	$1,510,200
	$1,860,200
Job Growth[3]	
Material Collection	10
MRF Operations	10
Plastic Manufacturing	9
Glass Manufacturing	4
Paper Mills	10
Recycling-Based Manufacturers	25
	68

Recycling Business Proposition

The "Evolving Ton: Change in Paper and Plastic 2000 - 2013

PAPER:

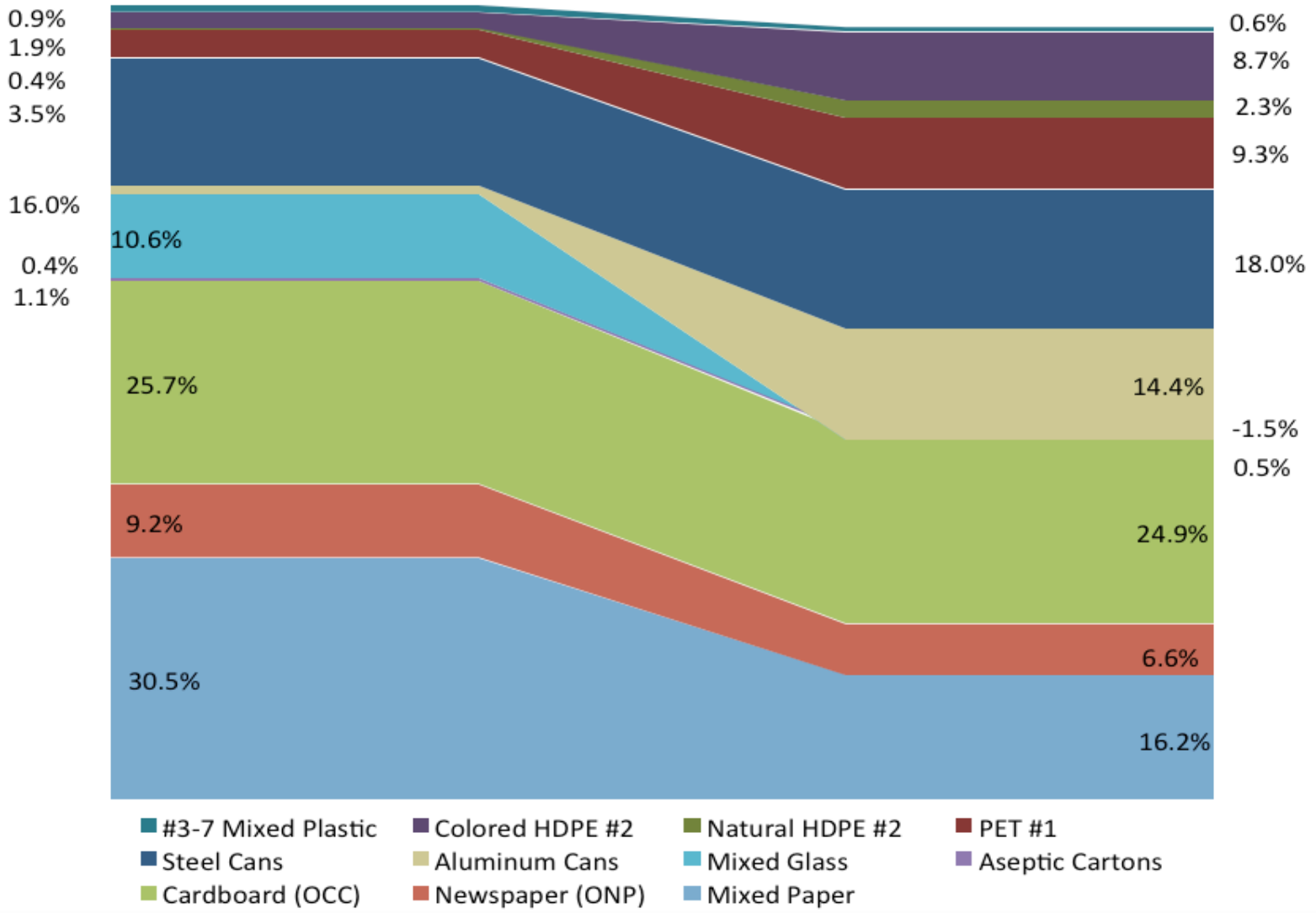
- 19,140,000 ton loss
- 22% decrease
- Mostly printed paper
- Online shopping

PLASTIC:

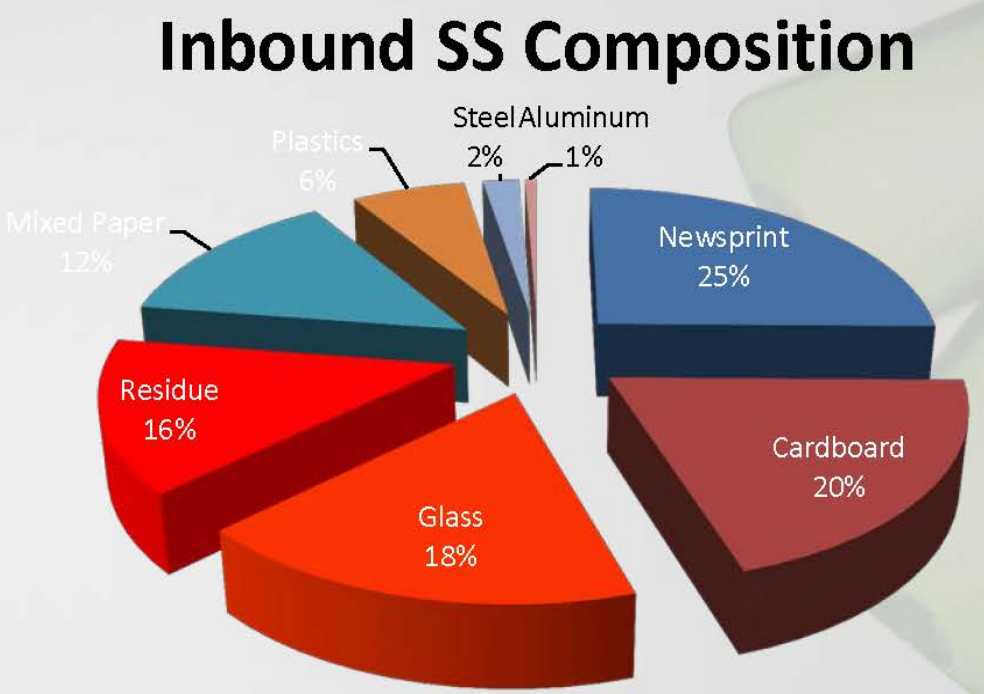
- 6,960,000 ton gain
- 27% increase
- Packaging is 43%
- Durables on the rise

THE MRF BUSINESS PROPOSITION

The quantity of material is represented on the left side of the chart and the value of the material is represented on the right side of the chart.



SS Inbound Materials – Stream is changing

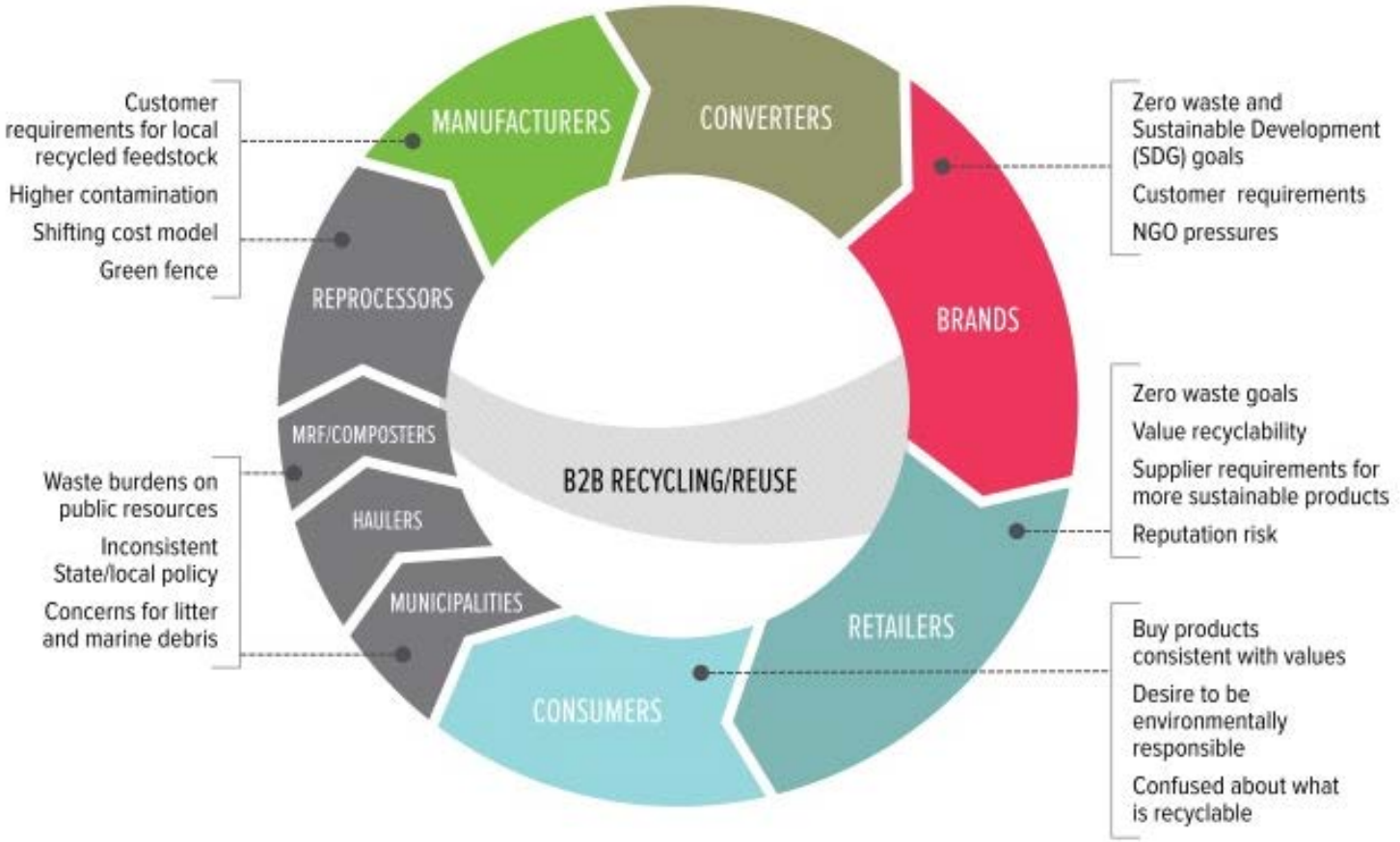


- Fiber represents 57% of the inbound stream
- Residue is 16-19% of the inbound stream
- Glass makes up 18% of the material processed at our MRFs.
- **34% of inbound material has negative value - glass/residue**

Courtesy of Susan Robinson, Waste Management

THE CIRCULAR ECONOMY

Key Players and Drivers for Change



Thank You

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