



Update from Michigan's Chemical Industry

Michigan House Committee
on Natural Resources and Outdoor Recreation

May 27, 2021

John Dulmes, Executive Director



Chemistry is Essential



Michigan chemistry...



At **\$12.2B**, is the **6th largest** manufacturing industry in the state



Provides **21,149** direct jobs and another **29,470** related jobs



Generates **\$1.9B** in payroll across **333** establishments



Has an average wage of **\$90,405**, **36% higher** than the average manufacturing wage



Generates **\$370M** in state & local taxes, and **\$371M** in federal taxes



Invests \$593M to build & update equipment and facilities



Ships \$4.1B in products to customers around the world



Generates an additional **42,222 jobs** in plastics & rubber products



Chemical manufacturing's economic benefit to Michigan

Table 8.3 - Occupation/Segment Mix in the Business of Chemistry, 2018

	<u>thousands of people</u>
Management	39.0
Managerial Support Positions	18.7
Chemical Engineers	10.6
Other Engineers	15.7
Life Scientists	1.1
Chemists	13.2
Other Scientists	1.3
Information Technology Professionals	6.0
Other Professionals	4.0
Technicians and Other Technical Support	31.6
Marketing and Sales	20.9
Administrative Support	55.5
Knowledge Workers, Total	217.5
<i>Knowledge Workers as a % of Total</i>	<i>40%</i>
Supervisors	31.1
Trade and Craft	3.4
Plant Operators	236.9
Other	53.2
Other Workers	324.6
Business of Chemistry Total	542.1



What kinds of direct jobs does the business of chemistry provide?

Source: American Chemistry Council analysis based on Bureau of Labor Statistics.

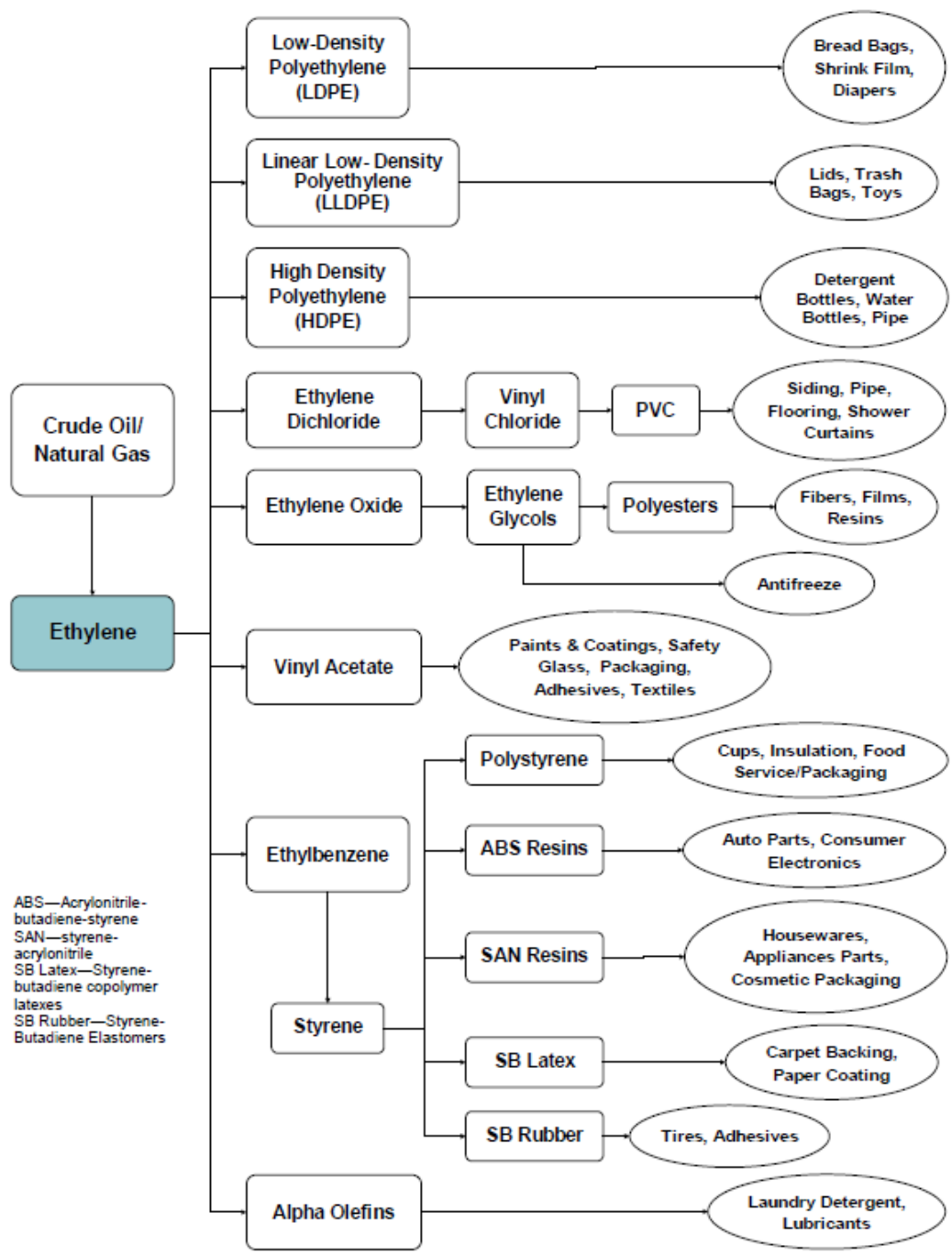
Did you know?



- The business of chemistry in Michigan is one of our state's largest manufacturing sectors.
 - The industry is Michigan's third-largest export sector.
- Science: An estimated 20% of all U.S. patents are for chemistry-related innovations.
 - Automotive: Every light vehicle produced contains approximately \$3,500 worth of chemistry products on average.
- Construction: Every new home built contains approximately \$15,000 worth of chemistry products.



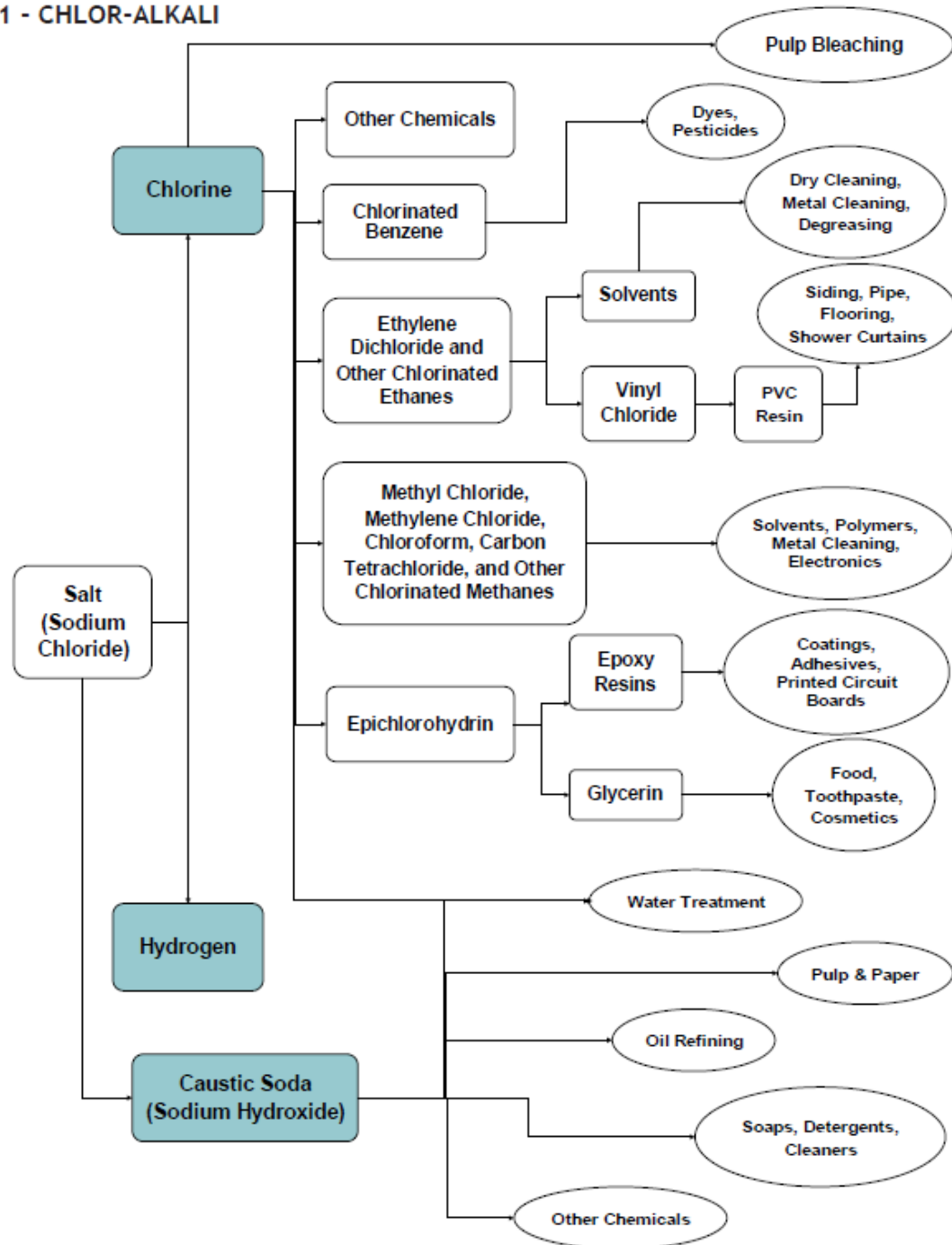
A.4 - ETHYLENE



What does the chemical value chain look like?

Organic chemicals
 =
 made from
 carbon-based feedstocks
 like oil/gas or biomass

A.1 - CHLOR-ALKALI



What does the chemical value chain look like?

Inorganic chemicals
=
made from
non-carbon-based feedstocks
like salts, metals, or gases

How is the industry regulated?



The business of chemistry is regulated by many federal and state agencies, including:

- Environmental Protection Agency (EPA)
 - Chemicals in commerce
 - Pesticides (**MDARD**)
 - Clean air, clean water, wastes, cleanups, etc. (**EGLE**)
- Food and Drug Administration (FDA)
- Consumer Product Safety Commission (CPSC)
- Occupational Safety and Health Administration (OSHA) (**MIOSHA**)
- Department of Transportation (DOT) (**MDOT**)
- Department of Homeland Security (DHS)
- Drug Enforcement Administration (DEA)

Industry standards and codes



RESPONSIBLE CAR
OUR COMMITMENT TO SUSTAINABILITY



- Environmental, health, safety, and security initiatives include Responsible Care and Responsible Distribution.
- These are ISO performance certifications involving mandatory processes, reporting, and audits.
- Responsible Care companies have employee safety records nearly 5 times better than the overall manufacturing sector.

Overview of 2021 Policy Priorities



Mission:

Represent our members to influence policies that promote and grow a safe, sustainable, and competitive business of chemistry in Michigan.

1. Ensure the Responsible and Effective Regulation of Chemistry Products

2. Promote Competitive Manufacturing Policies

- Environmental Stewardship
- Energy Competitiveness
- Safety and Security
- Workforce Development

3. Advance Practical Policies to Allow Safe and Successful Operations

Materials Management and Sustainability



Plastics and Sustainability

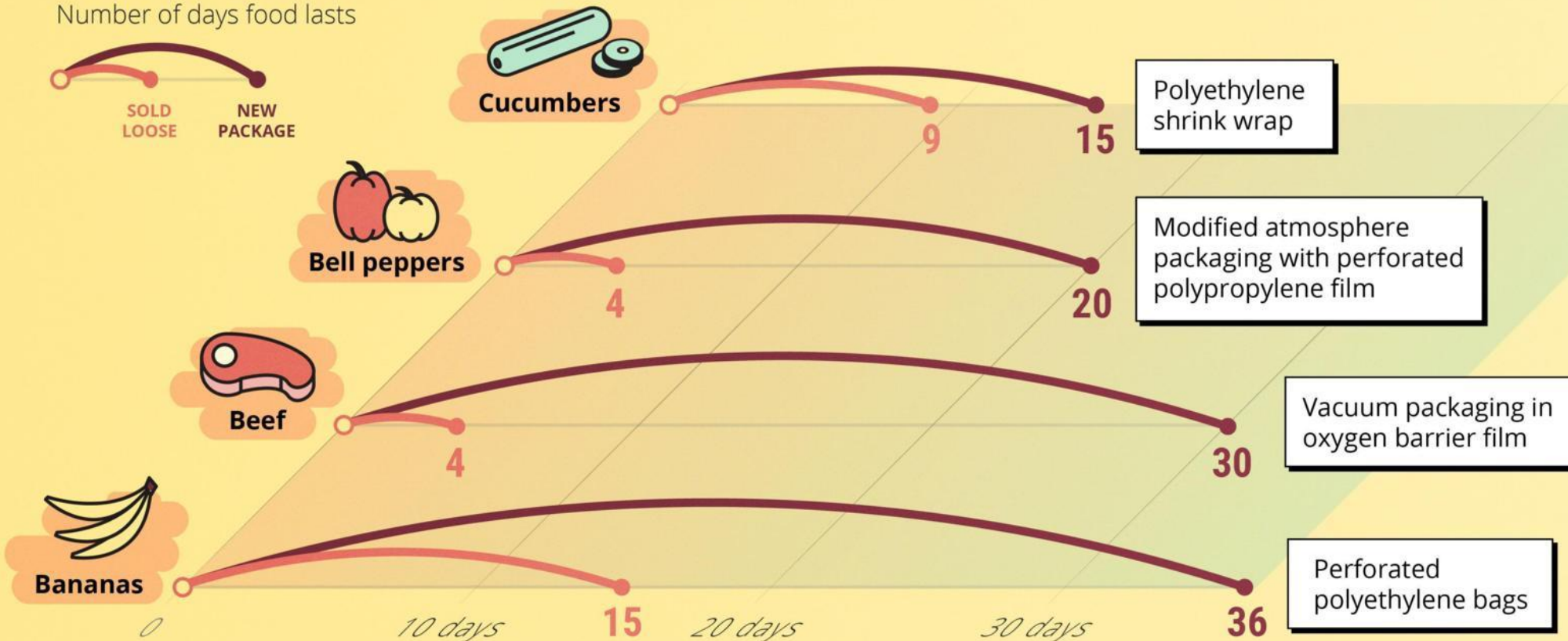


Extended life

Modern plastic packaging can lengthen the life of food in your fridge

BBC
capital

Number of days food lasts



Source: Flexible Packaging Association, Journal of Food Science Technology

© Piero Zagami

Environmental Costs and Substitution Quantities for Plastic and Alternatives

Average Environmental Cost per Tonne



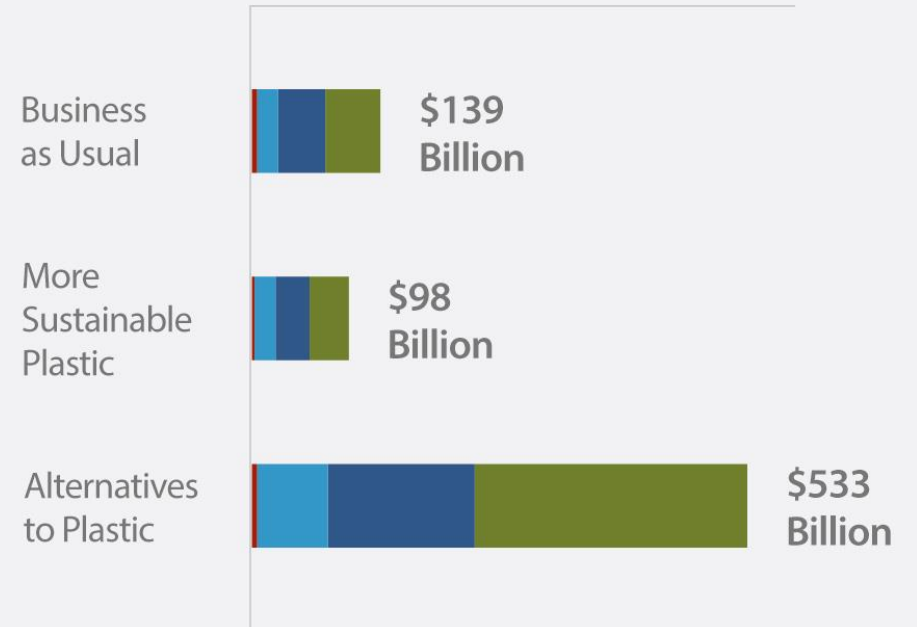
Average Tonnes Required per Unit of Function



The Environmental Cost of Business as Usual Plastic, Alternatives to Plastic and a More Sustainable Plastic in Consumer Goods (Source: Trucost, 2016)

- Ocean Damage
- End of Life Management
- Transport
- Production

Environmental Cost (US\$ Billion)
\$0 \$100 \$200 \$300 \$400 \$500 \$600



What is Advanced Recycling?

Leveraging chemistry to convert post-use plastics into valuable products which extend the life of the plastic

Outputs:

- Virgin-grade plastics
- Specialty chemicals
- Basic building blocks (monomers)
- Chemical feedstocks (naphtha)
- Fuels

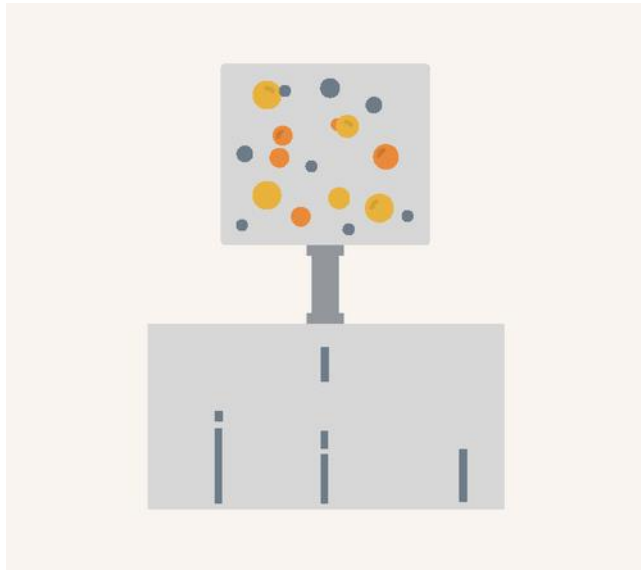
Products are then used as alternative to fossil-based products

Example of Pyrolysis Process



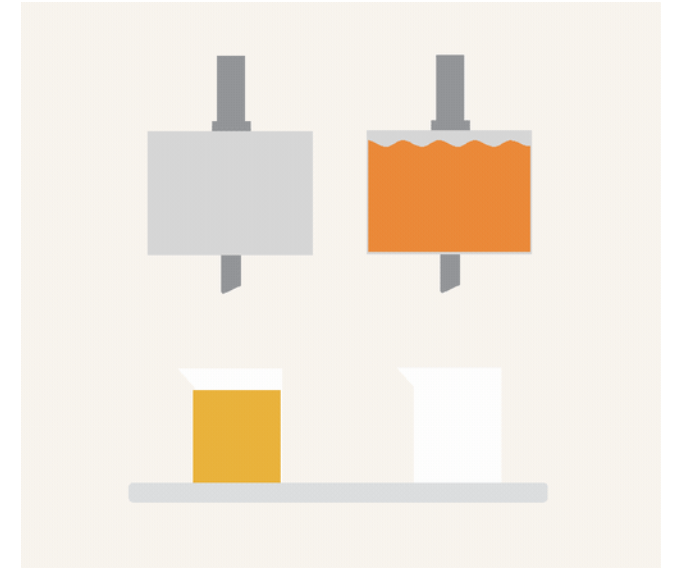
Step 1

Once the plastic waste is collected, it's prepped for conversion by shredding, removing metals, drying, and pelletizing.



Step 2

The pelletized plastic material is then heated and vaporized in an oxygen starved environment.



Step 3

The vapor is captured, cooled into a hydrocarbon liquid and processed into commercial grade ultra-low sulfur diesel, naphtha (gasoline) and wax.

Case Example: Brightmark Energy



- **Location:** Ashley, Indiana
- \$260 million financing
- **Input:** 100,000 tons of post-use plastics/annually
- **Output:** 18M gal ultra-low sulfur diesel & naphtha + 6M gal of wax
- **Job creation:** International Brotherhood Electrical Workers (IBEW), Union Boilermakers, International Brotherhood of Bridge Structural and Ornamental Workers, and Pipefitters

Case Example: Brightmark Energy



Source: Brightmark

Recycling Economic Opportunity

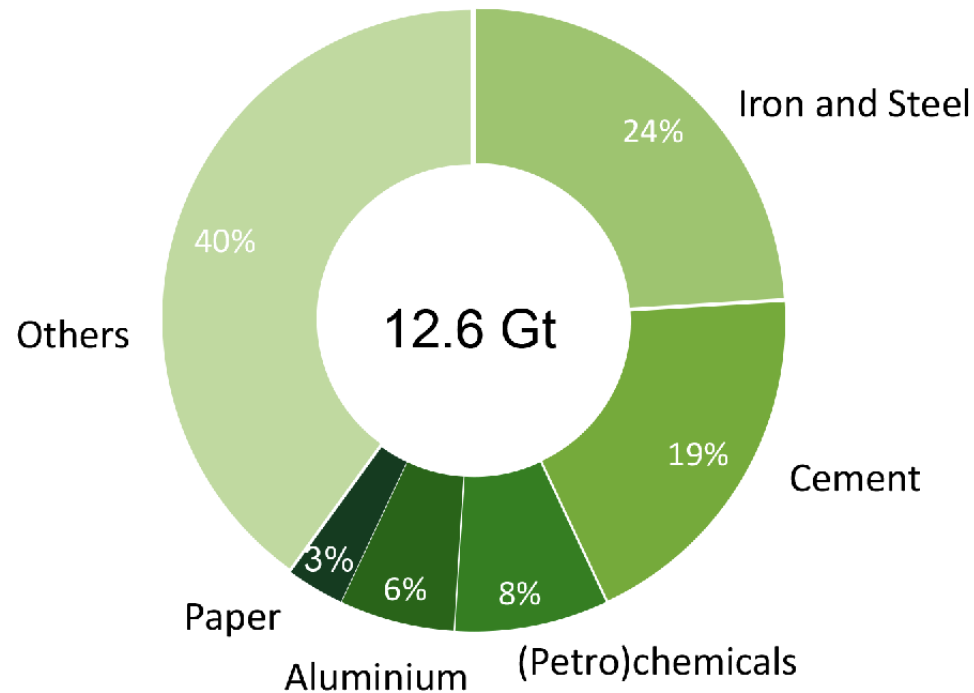


- Increased demand for recycled content is happening in commodity markets.
- Michigan only recovers about 100,000 tons per year in mixed plastics.
- Along with natural supply and demand shifts, Michigan can promote the development of recycling **infrastructure** across communities in the state to help meet this demand and attract facilities (like Brightmark or others), thereby creating investment and jobs in a more circular economy.
- Recycling is generally preferable from both a sustainability and economic perspective to the cheapest option (landfill).

Climate and decarbonization efforts



Global CO2 emissions from industry: key sectors

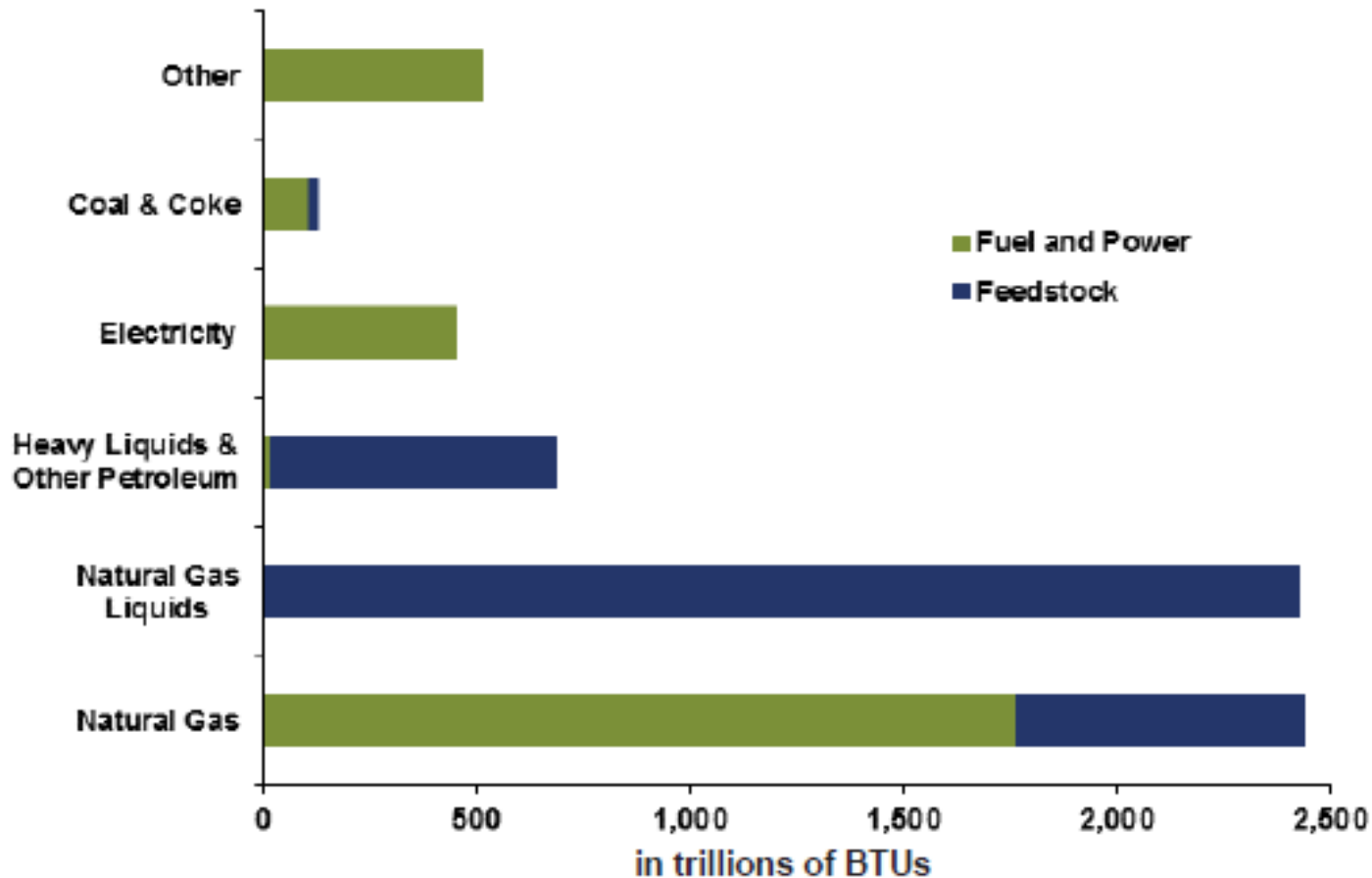


- Industries like steel, cement, and chemicals are essential, yet produce major carbon emissions.
- Companies have made commitments to carbon neutrality by 2050
- This is a global issue and we want to drive business competitiveness in Michigan

Climate and decarbonization efforts



Figure 10.3 - Composition of Energy Requirements, 2018

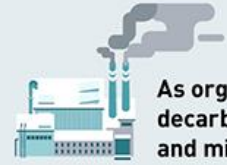


- Chemical production requires energy as:
 - Raw materials to make products
 - Fuel and power to generate heat, steam, pressure, and electricity

THE PATH TO DECARBONIZATION

THE 3 SCOPES OF CARBON EMISSIONS

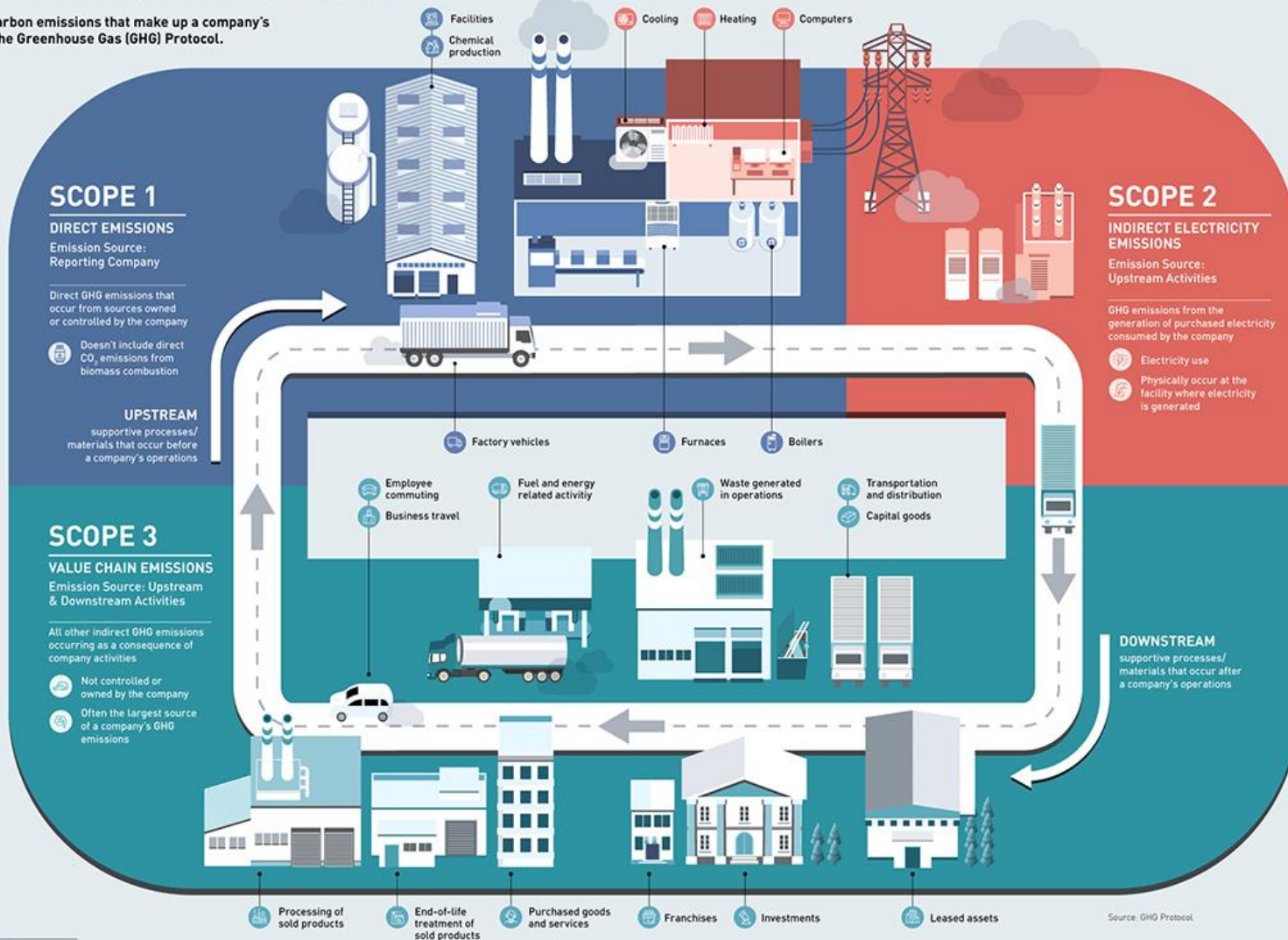
Here are the scopes of carbon emissions that make up a company's footprint, as defined by the Greenhouse Gas (GHG) Protocol.



As organizations face pressures to decarbonize, they need to define and minimize their carbon footprint.



GREENHOUSE GASES
Doesn't include emissions not covered by the Kyoto Protocol, e.g. CFCs, NDx, etc.



- Scope 1: Direct emissions at a facility
- Scope 2: Purchased electricity or steam (utilities or others)
- Scope 3: Value chain emissions (transportation, waste, product use and end-of-life)

Key developments for carbon neutrality



- Abundant and competitive low/zero-carbon electricity (renewables + nuclear)
- Advanced battery storage technology
- Energy efficiency improvements
- Carbon capture, utilization, and sequestration (CCUS) and direct CO2 capture
- Bio-based materials
- Electrified industrial processes (steam and temperature)
- Industrial hydrogen

These developments will be competitive advantages!



Policy Questions



- What is the role of global vs. federal vs. state policy?
- Some industries are competitive, energy intensive + trade-exposed
- Industry generally supports use of price signals:
 - Transparent
 - Predictable
 - Technology-neutral
 - Market-based
 - Economy-wide



Questions?

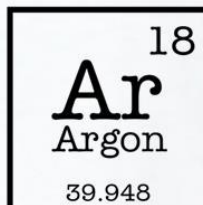


I'M OUT OF
**CHEMISTRY
JOKES**
I SHOULD



OF A NEW ONE

I tell bad
**CHEMISTRY
JOKES**
because all the
**GOOD
ONES**



I TOLD A
CHEMISTRY JOKE



THERE WAS NO REACTION

www.MichiganChemistry.com