

**CLEAN
PRODUCTION
ACTION**



Tools for Assessing the Impacts of Food Packaging and Plastics

Mark S. Rossi

June 14, 2019

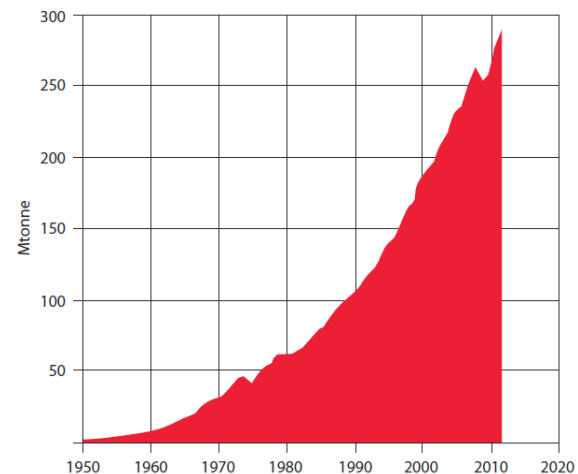
Clean Production Action – solutions for a safer & healthier tomorrow



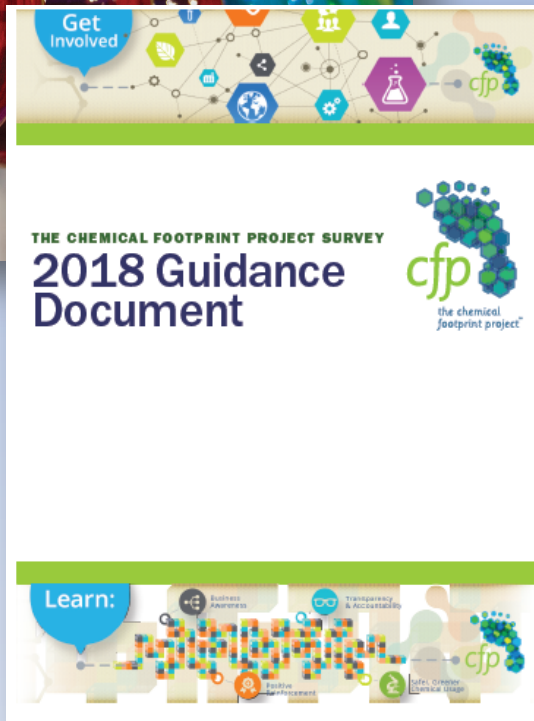
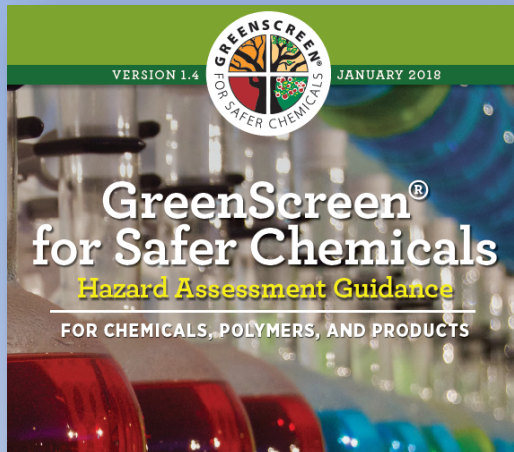
TABLE 3 Plastics and the Chemicals of High Concern they Consume

Chemicals of High Concern (plastics)	Total Global Consumption (million metric tons)	Consumed by Plastics (%)	Consumed by Plastics (million metric tons)
Ethylene dichloride (PVC) ^b	43.45	97%	42.14
para-Xylene (PET) ^b	42.89	88%	37.62
Benzene (PS) ^b	39.67	85%	33.52
Vinyl chloride monomer (PVC) ^b	32.79	97%	31.80
Ethylbenzene (ABS, PS) ^b	27.57	99%	27.29
Styrene (ABS, PS, SAN, SBR) ^b	23.63	91%	21.38
Ethylene glycol (PET, Nylon) ^a	21.00	80%	16.80
Cumene (PC) ^b	12.23	84%	10.27
Butadiene (ABS, SBR) ^b	9.28	94%	8.75
Acrylonitrile (ABS) ^a	5.35	96%	5.16
Phenol (PC) ^c	8.90	55%	4.88
Bisphenol A (PC, epoxy resins) ^c	4.04	96%	3.86
Acetone (PC) ^d	5.67	45%	2.53
Total	270.79	90%	243.48

FIGURE 2 World Plastics Production 1950–2012

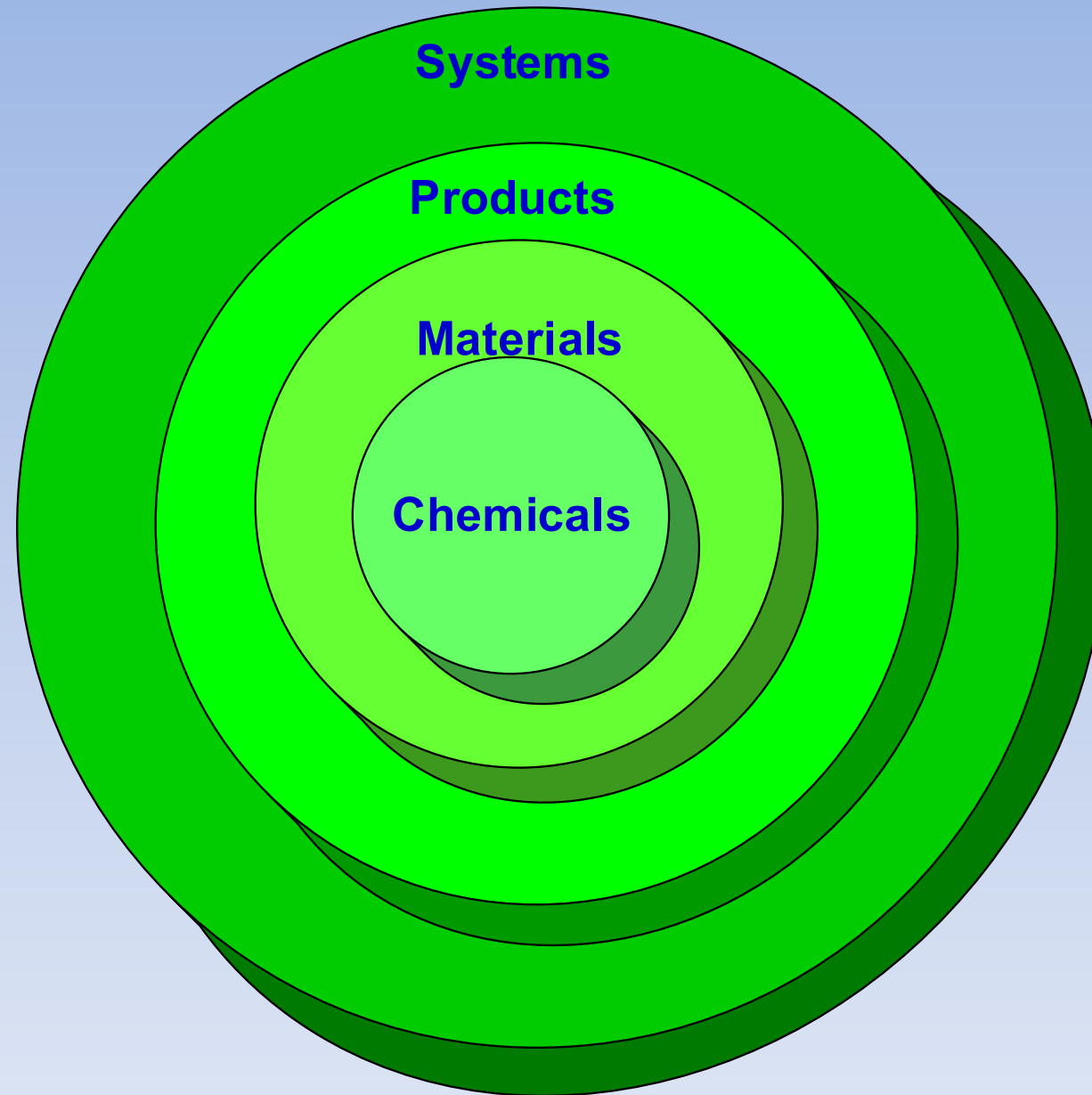


^a“Chemicals of High Concern” to human health or the environment = carcinogen, mutagen, reproductive / developmental toxicant; persistent, bioaccumulative, toxicant (PBT); endocrine disruptor; or chemical of equivalent concern.



Principles for Tools Development

- **Transparent:** all aspects of method disclosed freely to the public. Provide detailed guidance documents and trainings on GreenScreen & Chemical Footprint Project
- **Consistent:** applied in the same manner to each unit of analysis, be it chemical, material, product, corporation, etc.
- **Replicable:** results can be re-produced by others following the same rules
- **Simplify:** take complex information and make it useful for decision makers



Chemicals at the core of the circular economy



- Chemical hazard assessment method
- 18 endpoints
- Used by Apple, HP, Google, Levi's, Health Product Declaration Collaborative, USGBC LEED, etc.

Benchmark 4

Prefer – Safer Chemical

Benchmark 3

Use but Still Opportunity for Improvement

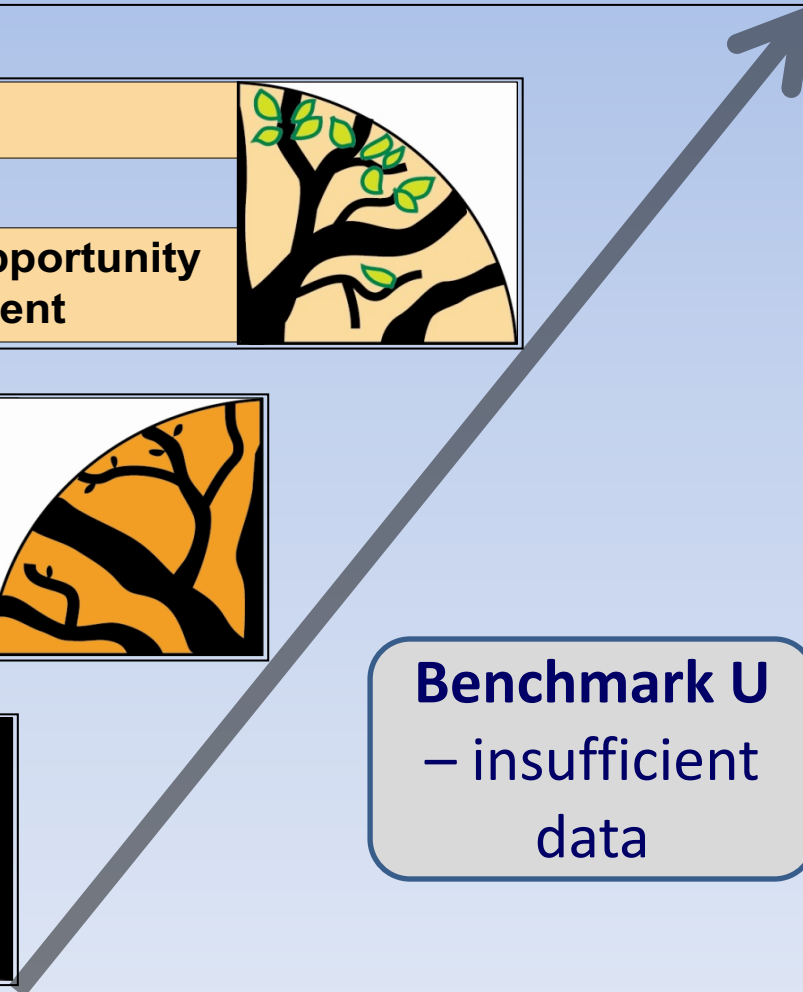
Benchmark 2

Use but Search for Safer Substitutes

Benchmark 1

Avoid – Chemical of High Concern

Benchmark U
– insufficient data



GreenScreen® Evaluation of Methylene Chloride and Alternatives

Chemical Name	CASRN	Group I Human					Group II & II Human								Ecotox		Fate		Physical		
		C	M	R	D	E	AT	ST		N		SnS	SnR	IrS	IrE	AA	CA	P	B	RX	F
								Single	repeated	Single	repeated										
Methylene chloride	75-09-2	H	NE	DG	DG	M	M	vH	H	vH	vH	L	DG	H	H	M	L	vH	vL	L	L
Benzyl alcohol	100-51-6	L	L	L	M	DG	M	L	L	M	H	H	L	L	H	L	L	vL	vL	L	L
2-(2-butoxyethoxy) ethanol	112-34-5	L	L	L	L	DG	L	L	H	DG	L	L	DG	M	H	L	L	vL	vL	L	M
Dimethyl sulfoxide	67-68-5	L	L	L	L	DG	L	L	L	L	L	L	L	M	M	L	L	L	vL	L	M
1,3-dioxolane	646-06-0	L	M	M	M	DG	L	M	M	M	L	L	DG	M	H	L	L	M	vL	L	H
Estasol (dibasic esters mixture)	95481-62-2	L	L	L	M	M	L	M	M	M	DG	L	DG	L	M	M	L	vL	vL	M	L
d-Limonene	5989-27-5	L	L	DG	L	DG	L	L	L	DG	DG	H	DG	H	H	vH	H	vL	M	L	M
Acetone	67-64-1	L	L	M	M	DG	L	M	M	M	M	L	DG	L	H	L	L	vL	vL	L	H
Methanol	67-56-1	NA	NA	NA	H	NA	H	vH	NA	NA	NA	NA	NA	NA	NA	L	L	vL	vL	NA	H
Toluene	108-88-3	DG	L	H	H	M	L	M	H	M	H	L	DG	H	L	H	H	H	vL	L	H
Formic acid	64-18-6	L	L	L	L	DG	H	vH	H	vH	DG	L	DG	vH	vH	M	M	vL	vL	L	M
Caustic soda	1310-73-2	L	L	L	L	L	H	vH	L	L	L	L	DG	vH	vH	M	DG	L	vL	M	L

GreenScreen® Evaluation of Methylene Chloride and Alternatives

Chemical	CASRN	Benchmark Score
Methylene chloride	75-09-2	1
Benzyl alcohol	100-51-6	2
2-(2-butoxyethoxy) ethanol	112-34-5	2
Dimethyl sulfoxide (DMSO)	67-68-5	3
1,3-dioxolane	646-06-0	2
Estasol (dibasic esters mixture)	95481-62-2	2
d-Limonene	5989-27-5	2
Acetone	67-64-1	2
Methanol	67-56-1	1
Toluene	108-88-3	1
Formic acid	64-18-6	2
Caustic soda	1310-73-2	2



FIGURE ES-2 Estimated Chemical Footprint of IV Bags Made from PVC/DEHP and Polyolefins



3



PVC



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Polyolefins

Number of Chemicals of High Concern

Chemicals of High Concern by Weight

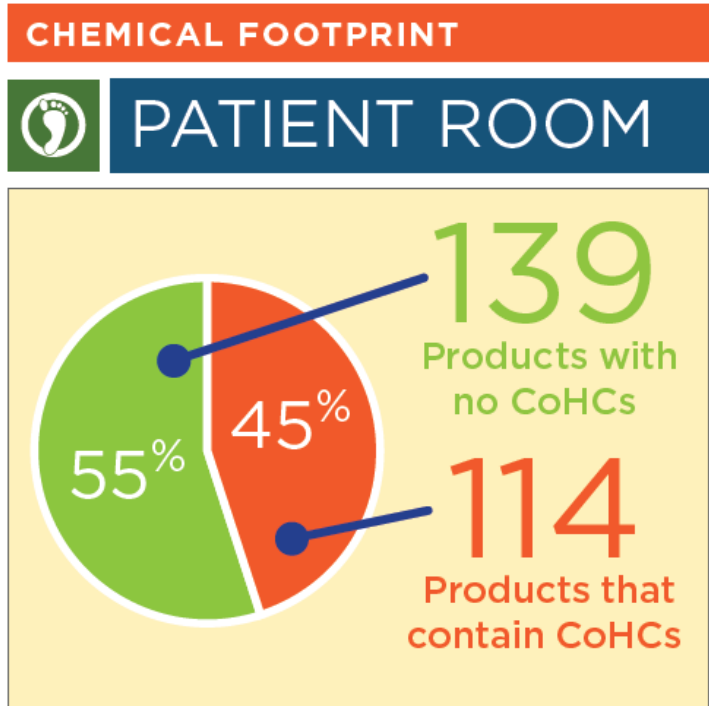
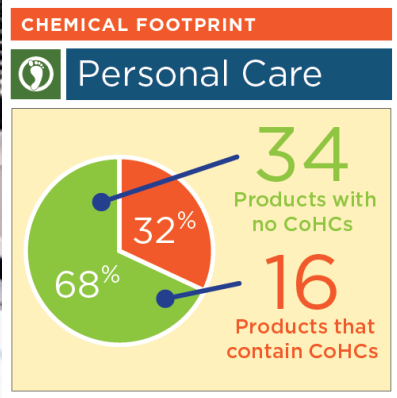
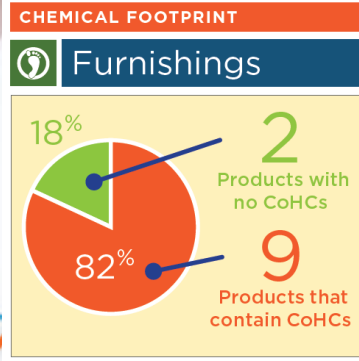
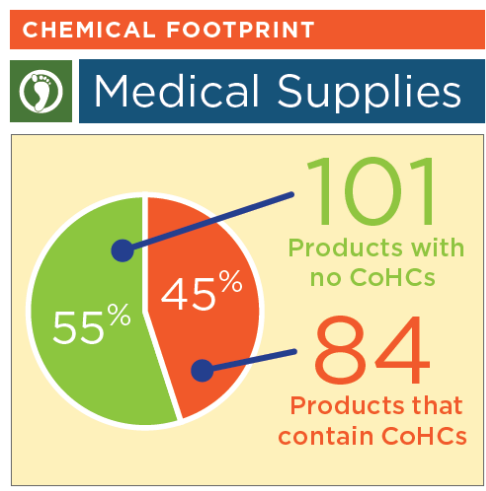
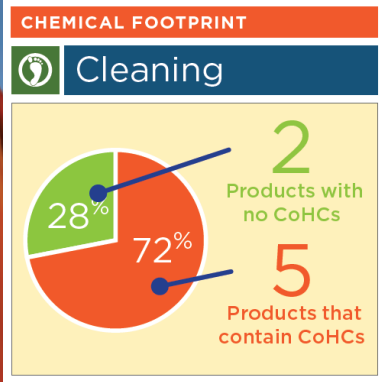
PVC = Polyvinyl chloride; DEHP = di(2-ethylhexyl) phthalate

Dignity Health, U.S. health care provider, reduced chemical footprint of IV bags by over 700,000 pounds over six year period by switching to polyolefin bags

Chemical Footprint of Products Commonly Used in Pediatrics Departments

CoHCs = Chemicals of High Concern

Eliminating PVC and associated CoHCs in medical supplies, would reduce 75% of the CoHCs in medical supplies

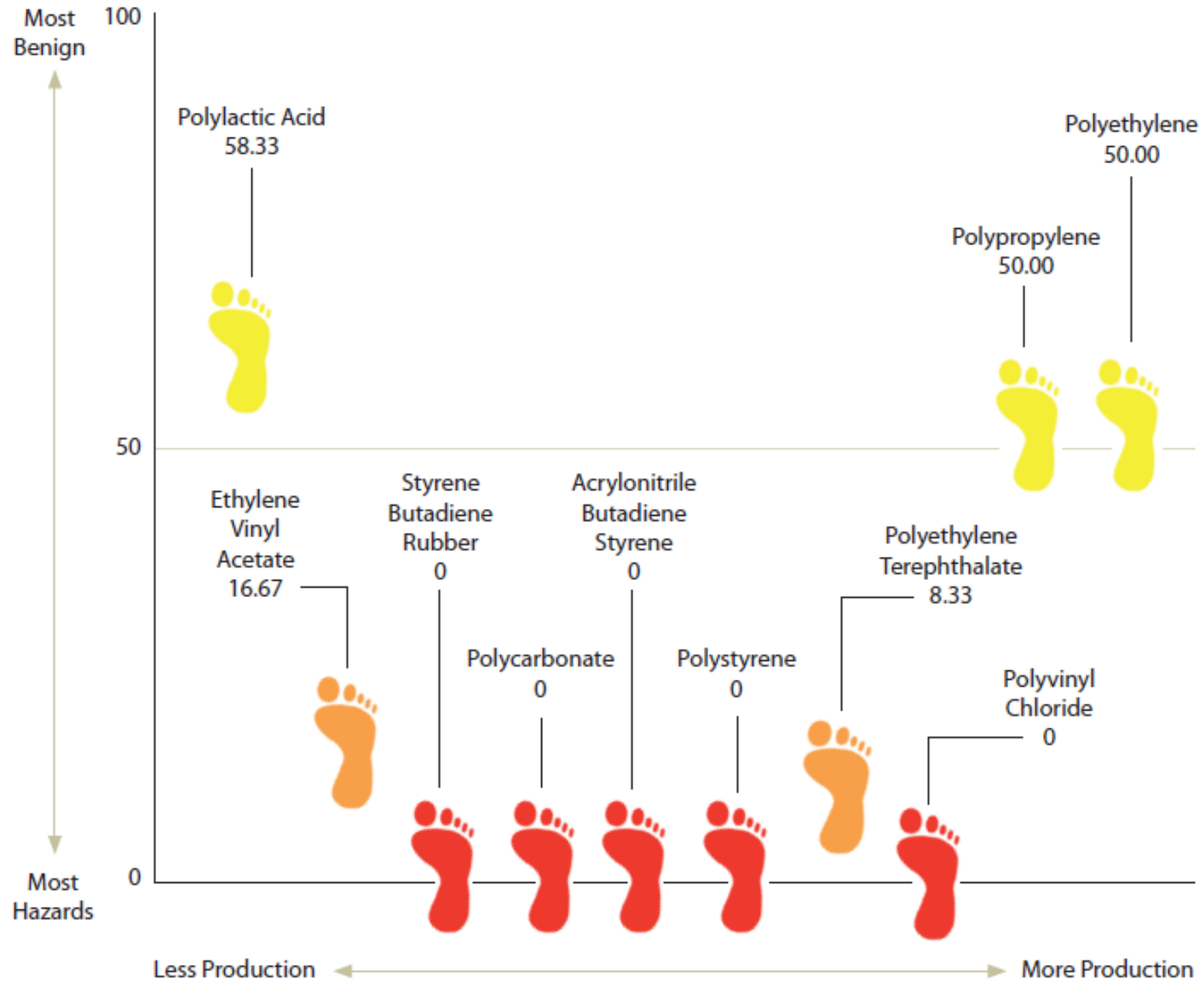




Plastics
Scorecard



FIGURE 6 Progress to Safer Chemicals in Polymer Manufacturing

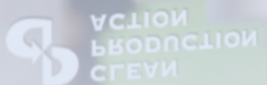
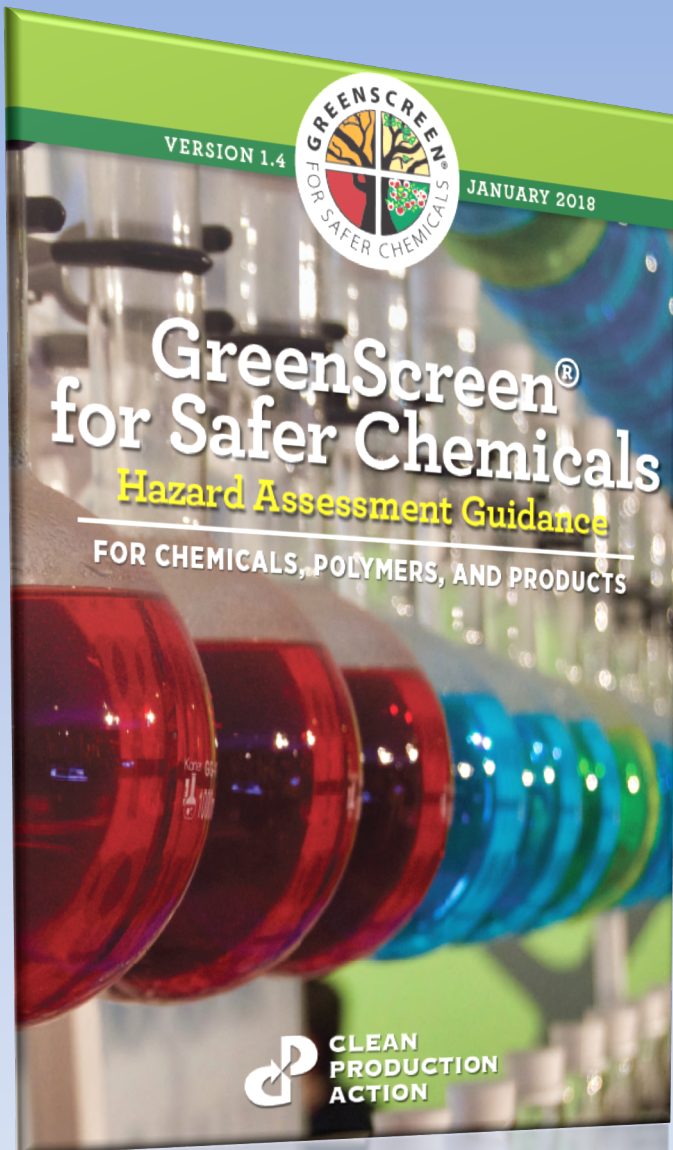




Simplify the complexity of toxicity for purchasers & provide manufacturers with incentives for disclosing chemicals in products, assessing hazards of those chemicals, and using safer chemicals

Resources

- *GreenScreen® for Safer Chemicals Hazard Assessment Guidance For Chemicals, Polymers, and Products*
<https://www.greenscreenchemicals.org/method/method-documents>
- *GreenScreen Certified™ Standard for Textile Chemicals*
https://www.greenscreenchemicals.org/images/ee_images/uploads/resources/GreenScreenCertified_Standard-For-Textile-Chemicals-V1-0.pdf
- *Plastics Scorecard* <https://www.bizngo.org/sustainable-materials/plastics-scorecard>
- *Chemical Footprint of Products Commonly Used in Pediatrics Departments*
https://www.cleanproduction.org/images/ee_images/uploads/resources/ChemicalFootprintPediatrics_Report_201712204.pdf
- *Alternatives to Methylene Chloride in Paint and Varnish Strippers*
https://www.greenscreenchemicals.org/images/ee_images/uploads/resources/cpa_bz_methylene_chloride_rpt_2015_10_27.pdf
- *Chemical Footprint Project 2018 Annual Report*
<https://www.chemicalfootprint.org/assets/downloads/2018ChemicalFootprintProjectReport.pdf>
- *The Chemical Footprint Project Survey: 2018 Guidance Document*
https://www.chemicalfootprint.org/assets/downloads/cfp_guidance_2018_20190102.pdf





Thank You 😊 Questions?

Mark S. Rossi, PhD

Executive Director

Clean Production Action

mark@cleanproduction.org

Get
Involved

