NEW TECHNOLOGIES FOR WASTE PROCESSING - CONVERSION

NEWMOA Solid Waste Program Staff Workshop – May 11, 2017

RRS recycle.com

Managing change in a resource-constrained world.

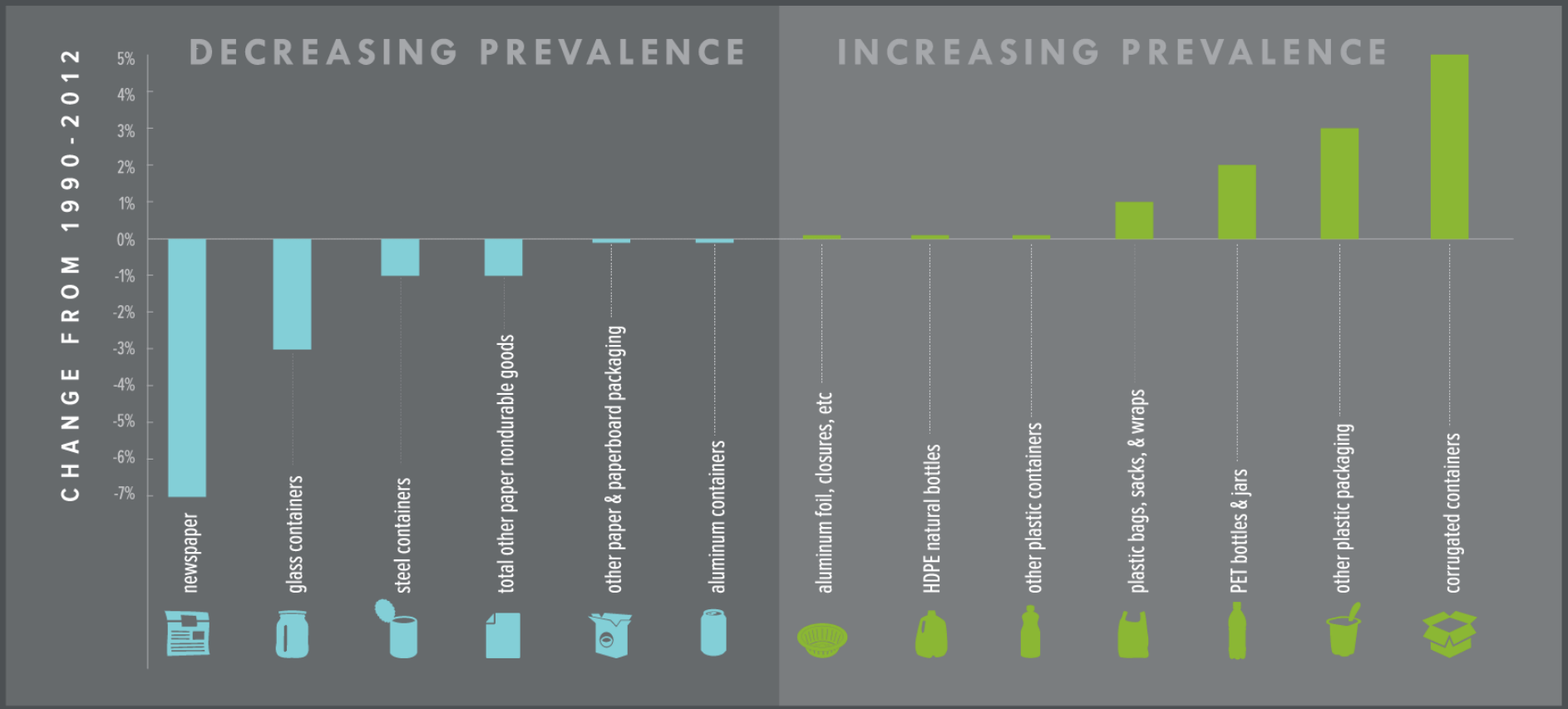
ORGANICS MANAGEMENT

WASTE RECOVERY

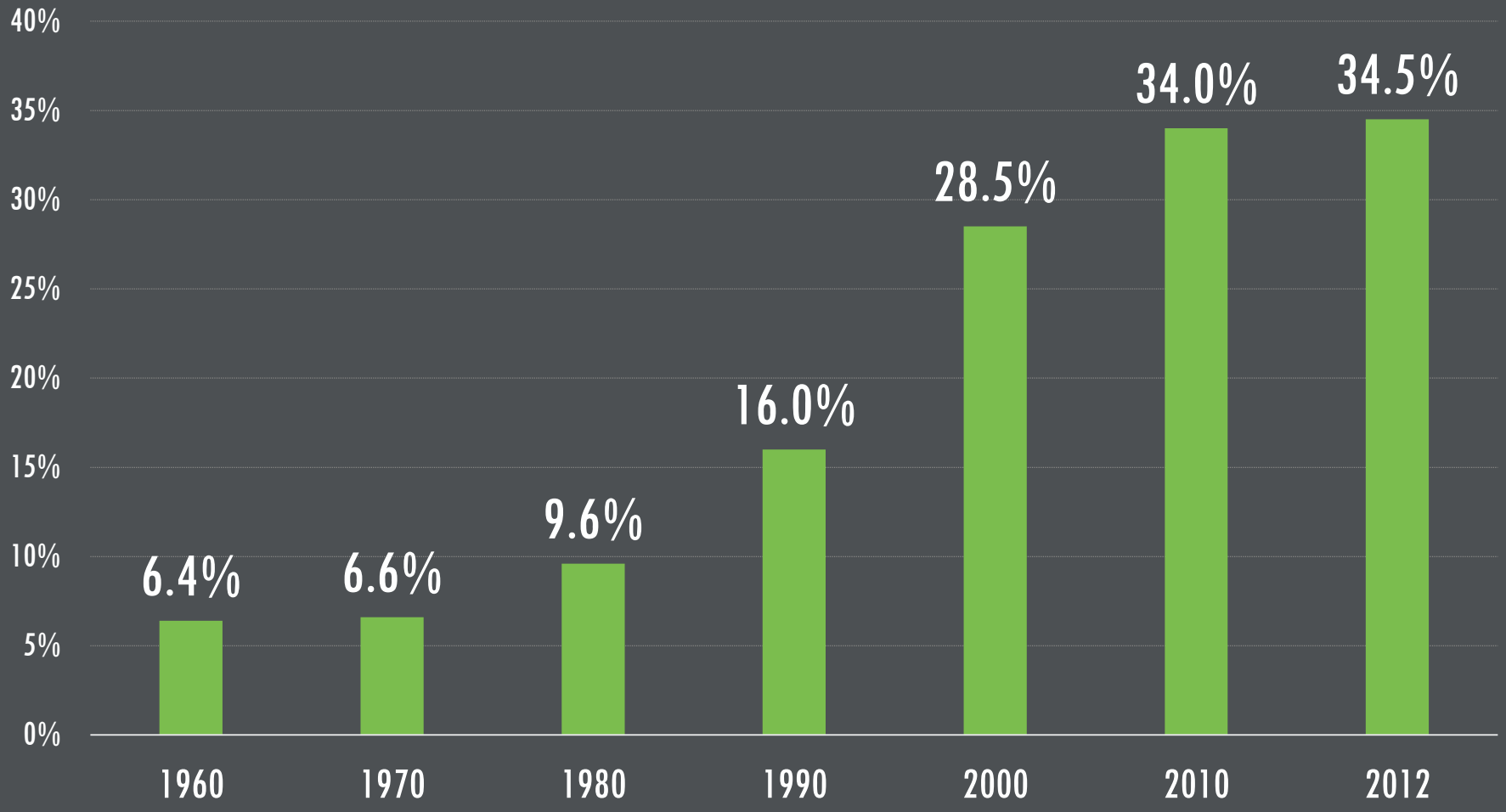
GLOBAL CORPORATE SUSTAINABILITY

since 1986

CHANGE IN PAPER AND PACKAGING FROM 1990-2012



MSW RECOVERY RATE (1960 – 2012)*



*Moore and Associates – April 2015

THE U.S. WASTE AND RECOVERY SYSTEM

MUNICIPAL SOLID WASTE

34.3%
2013 US Recovery Rate*

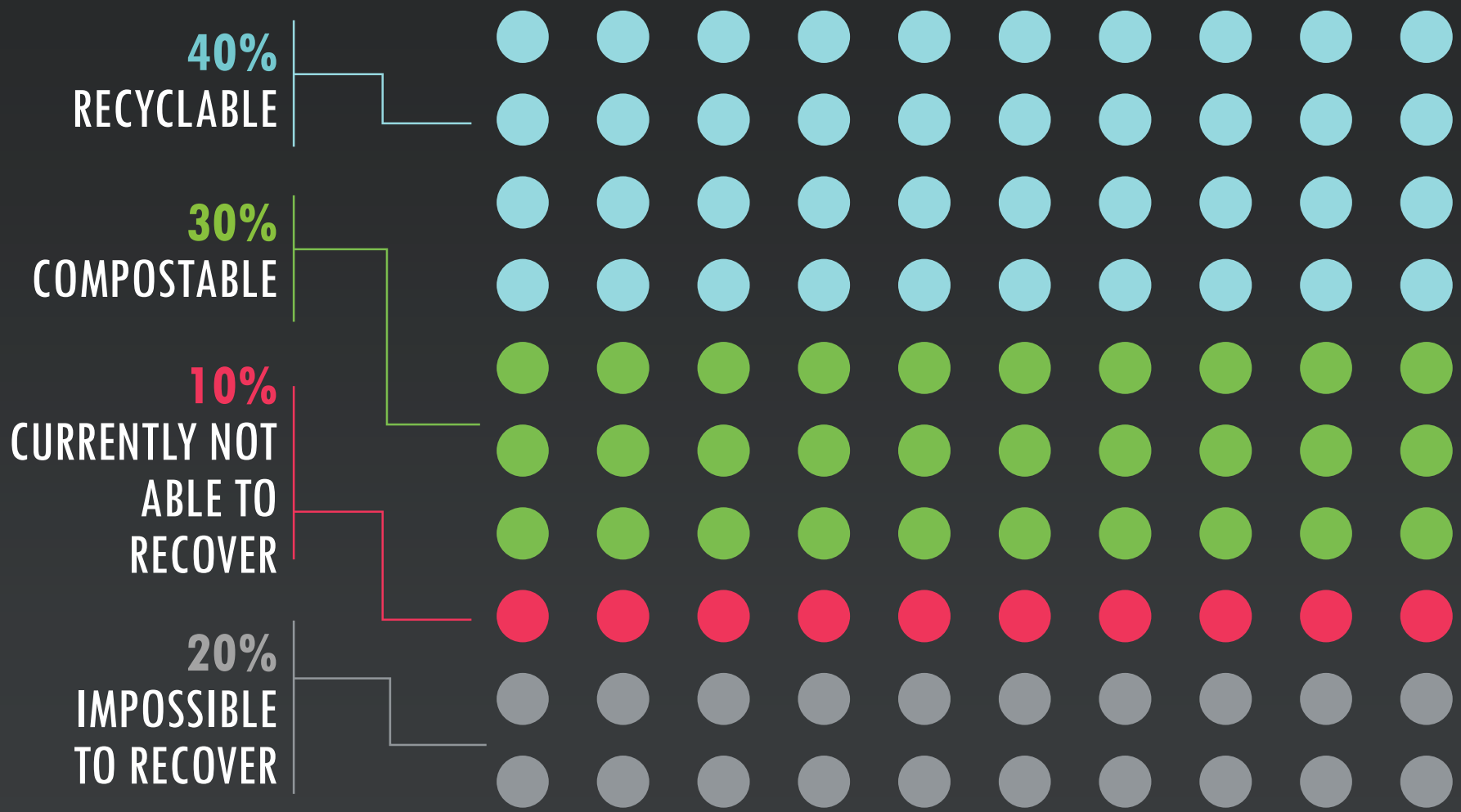
52.8%
Landfill

12.9% Waste to Energy

8.9%
Avg organics recycling rate

25.4%*
Avg recycling rate

*US EPA defines Recovery Rate as Recycling and Composting. 65% of US population has curbside access. C&D is accounted for separately.

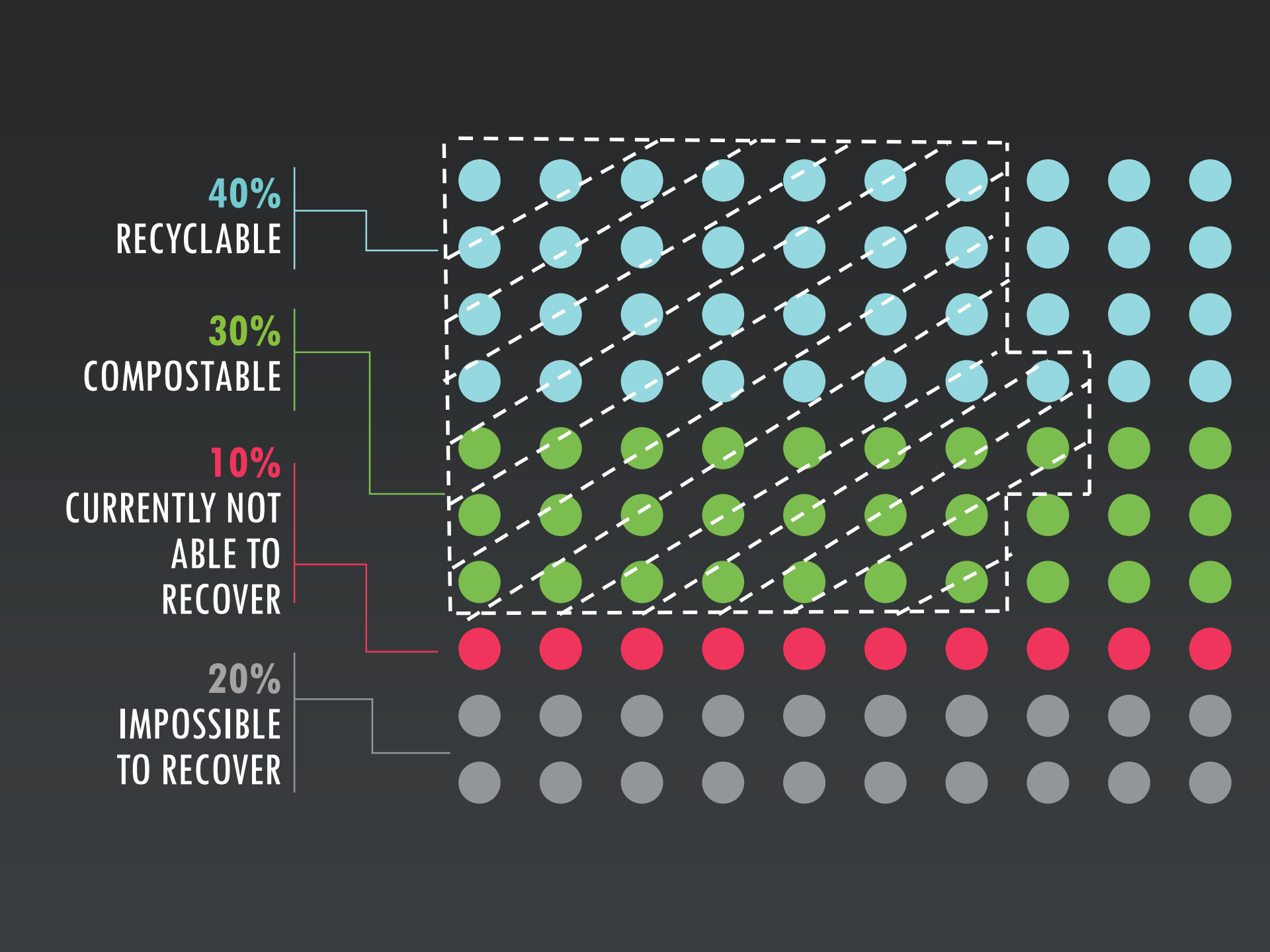

40%
RECYCLABLE
30%
COMPOSTABLE
10%
CURRENTLY NOT
ABLE TO
RECOVER
20%
IMPOSSIBLE
TO RECOVER

ONLY ABOUT 70% OF THE US WASTE STREAM CAN CURRENTLY BE RECYCLED OR COMPOSTED.

PHOTO BY RECYCLED BEAUTY / CALLAWAYPHOTO.COM

51%

CURRENT MAXIMUM FACILITY RECOVERY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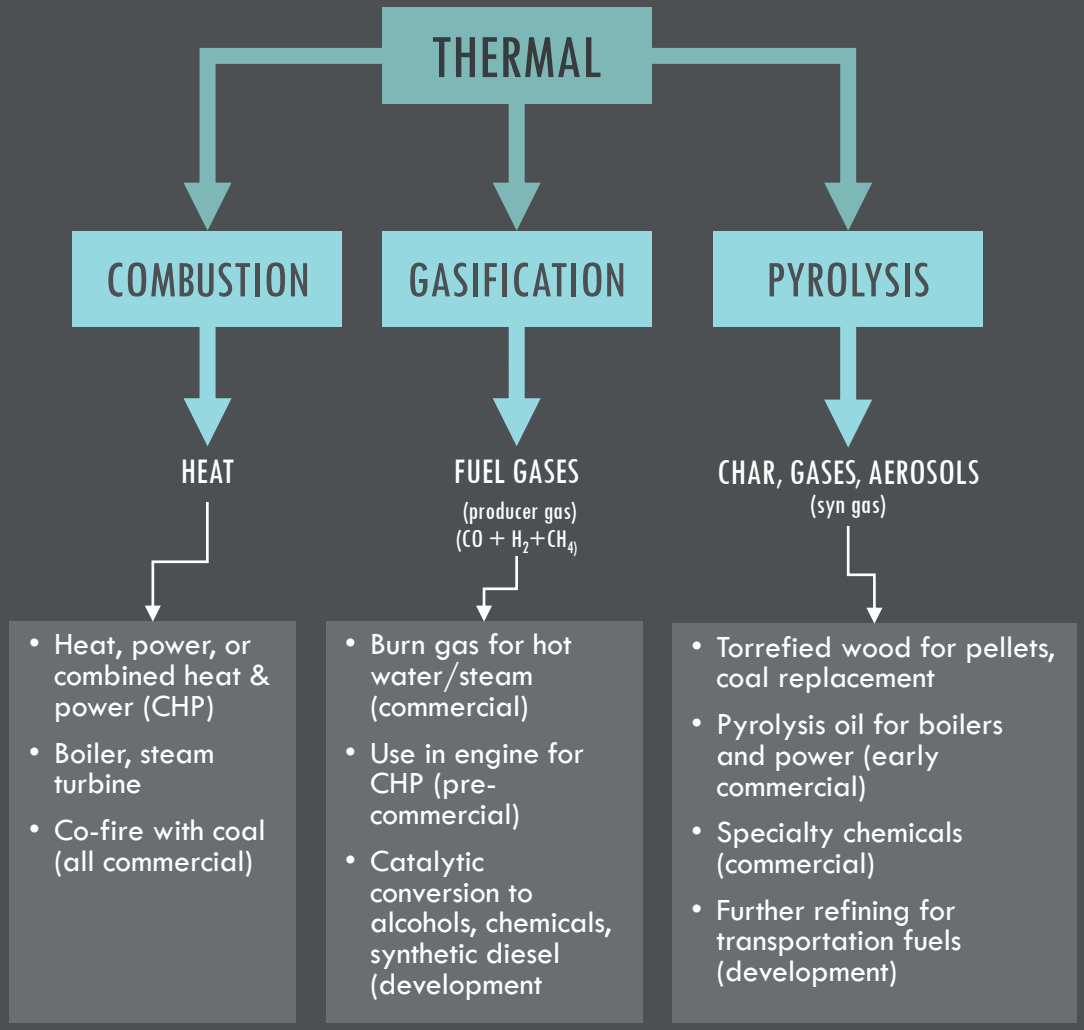
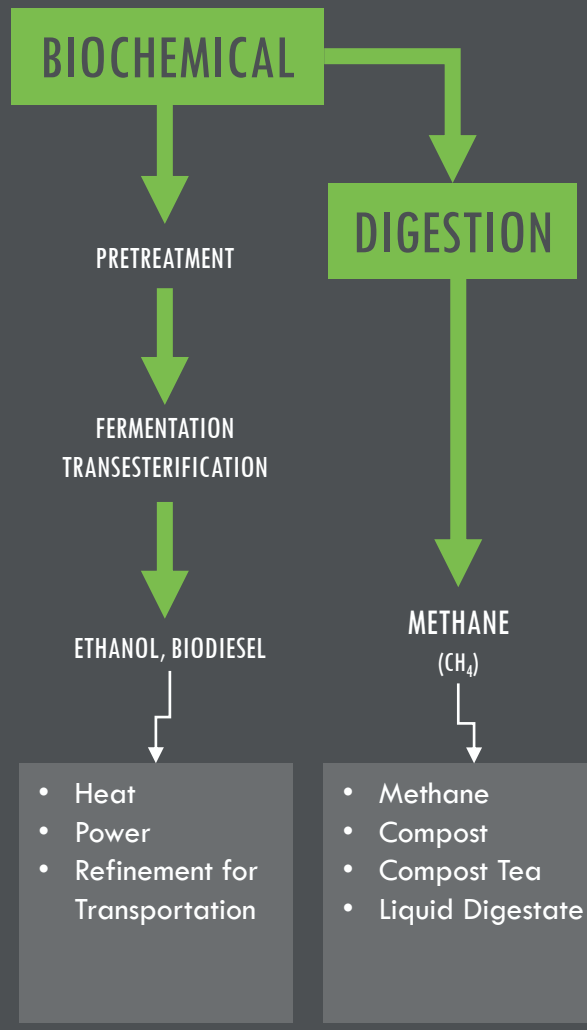
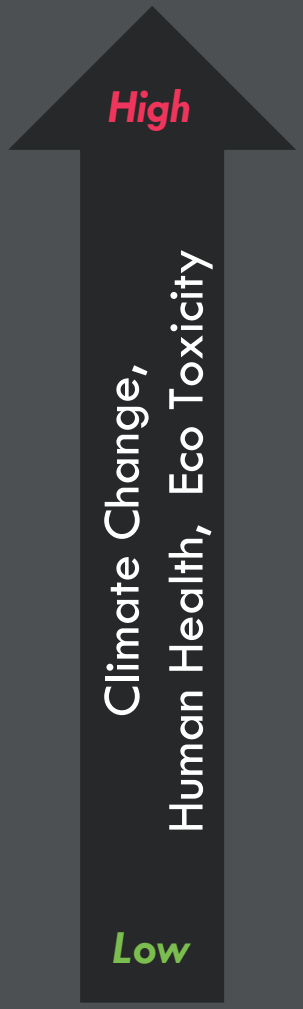
WASTE-TO-ENERGY PATHWAYS



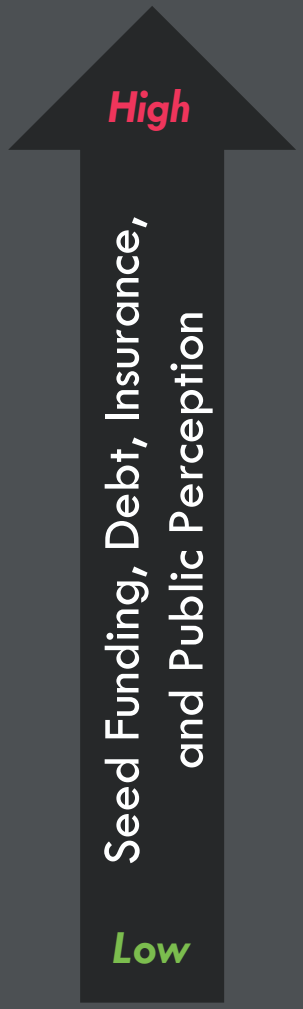


CONVERSION TECHNOLOGY: ENVIRONMENTAL RISK



- MASS BURN
- REFUSE FUEL
- GASIFICATION
- PYROLYSIS/ GASIFICATION
- ANAEROBIC/AEROBIC DIGESTION

CONVERSION TECHNOLOGY: FINANCIAL RISK



- PYROLYSIS/ GASIFICATION
- GASIFICATION
- MASS BURN
- REFUSE FUEL
- ANAEROBIC/AEROBIC DIGESTION

CONVERSION TECHNOLOGY SUMMARY COMPARISON

	FEEDSTOCKS	PRODUCTS	WASTES	COMMERCIAL STATUS	RISK FACTORS
Thermal - Mass Burn	Raw MSW with some sorting (e.g. ferrous, bulky)	Electricity or Combined Heath and Power	Ash and Stack Emissions	Well established	Expensive, emissions, ash is hazardous, incomplete (60% disp)
Thermal - RDF	Dry plastics and cellulosic wastes (e.g. paper, and wood)	Fuel Pellets	Process Waste, Ash, Stack Emissions (reduced)	Established, but uncertain due to market risks	Processing equipment upkeep, fluctuating/low energy prices
Gasification	Raw MSW with some sorting (e.g. ferrous, bulky)	Syngas, Synfuels	Stack Emissions	Few to no commercial scale installations in US	Scale up financial risks, limited conventional financing options.
Pyrolysis	Dry plastics and cellulosic wastes (e.g. paper, and wood)	Diesel, Char, Oils, and Energy	Stack Emissions, Char and Ash	Few to no commercial scale installations in US	Scale up financial risks, limited conventional financing options.
Digestion	Yard waste and SSO. Industrial organic wastes.	Methane and compost	Screened overs (solid digestate) and liquid disposal.	Both anaerobic and aerobic (composting) established.	AD is costly and both types of digestions encounter odor concerns

TIMEFRAMES FOR ENGINEER/PROCURE/CONSTRUCT (EPC)

	FEEDSTOCKS	ENGINEER/PROCURE	CONSTRUCT	TOTAL TIME
Thermal - Mass Burn	Raw MSW with some sorting (e.g. ferrous, bulky)	48 months	36 months	84 months/ 7 Years
Thermal - RDF	Dry plastics and cellulosic wastes (e.g. paper, and wood)	36 months	36 months	72 months/6 Years
Gasification	Raw MSW with some sorting (e.g. ferrous, bulky)	36 months	30 months	66 months/ 6.5 Years
Pyrolysis	Dry plastics and cellulosic wastes (e.g. paper, and wood)	36 months	30 months	66 months/ 6.5 Years
Digestion	Yard waste and SSO. Industrial organic wastes.	24 months	24 months	48 months/ 4 Years

CONVERSION TECHNOLOGIES - OBSERVATIONS

- Developers Frequently Sell the "Silver Bullet" Solution
- Low Conventional Energy Pricing Severely Impacts Viability
- Absence of Carbon Monetization Also Impacts Viability
- Economies of Scale "Blind" Developers to Scale Challenges
- Flow Control Challenges Scaling

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