Connecting the Dots

The Intersection of Plastics, Energy and Planetary Health

https://www.insurancejournal.com/magazines/mag-coverstory/2019/05/20/526867.htm
Running in Circles for 4 Decades

Dr. Mike Biddle, Founder, MBA Polymers
CEO, Material Solutions
Managing Director, Evok Innovations

Because sustainability matters.
Work and Life Navigation Questions

1. Why Are We Here?  
   Purpose

2. Where Do We Want to Go?  
   Vision

3. How Do We Get There?  
   Strategy

4. Who Will Get Us There?  
   Responsibility
Why am I here?

Why did I spend nearly 40 Years Playing with Plastics?

\[ y = a \cdot b^x \]
In the 70’s, PLASTICS were the “grooviest” materials on the planet

https://www.sciencehistory.org/distillations/plastic-town

http://www.halloweencostumes.net/green-polyester-leisure-suit.html

https://learning.knoji.com/groovy-space-age-design/
A Material of the “Space-Age”

https://clickamericana.com/topics/places/monsanto-home-of-the-future-at-disneyland-1965

“I have One Word For You…"

Plastics!

https://www.youtube.com/watch?v=eaCHH5D74Fs
And Was He Ever Right!

Source: UN GRID-Arendal

And remember that simple equation?

Definition:
An **EXPONENTIAL FUNCTION** is a function of the form:

\[ y = a \cdot b^x \]

Constant, Base, Exponent

Where \(a \neq 0\), \(b > 0\), \(b \neq 1\), and \(x\) is a real number.

http://lugezi.com/images/
70’s

The Gas Crisis Decade

National Museum of American History - Smithsonian Institution  First day of gas rationing, California, May 9, 1979

80’s

The Garbage Crisis Decade

“Over Half of US Cities will exhaust current landfills by 1990”  WorldWatch Inst., 1987

Pivot #1, Act 2: Can We Turn Lemons into Lemonade?

Junk Into Money

Here’s one fellow who has no objection to $65 oil: a plastics recycler

By Kerry A. Dolan

ACOMPLISHMENTS INSIDE Michael Biddle’s 45,000-square-foot recycling plant in Richmond, Calif., Pieces of fax machines, telephones, keyboards and cell phones are fed into green hoppers atop 20-foot-tall chutes. Pipes and conveyor belts run everywhere. Amid the whirring fans and churning grinders, you can pick out the sounds of metal clicking as it gets sucked out by ejectors, plastic ping-pong as it is pulled away from soil and paper, air jets whooshing as they separate light-sulfur plastic from dark. Out the end come gray pellets, sorted into six or more grades of reusable plastic.

To Biddle it’s a symphony, the result of nearly two decades of hard work. He claims to be the first to figure out how to take nearly any kind of plastic trash, which is usually a mongrel blend of up to 20 different plastics, and separate it by chemical type. Biddle’s factories make the three important plastics used in durable goods and electronics: polypropylene, acrylonitrile butadiene styrene (ABS) and polystyrene. “We’re changing the way plastic is made, just like minimalists changed the way people made steel was made,” he says.

Every year 40 million tons of plastic—in cars, refrigerators, personal computers, fax machines, coffeemakers, food bins, bottles and so on—are dumped in landfills in the U.S. Landfill space happens to be plentiful at the moment, but it might not be for long, and in any event many Americans are wracked with guilt at the notion of all this compressed garbage sitting around. Pressure to recycle is building. In Europe it is mandatory for producers of electronic goods to take back their products and recycle them.

The swelling waste stream is the fuel for Biddle’s ABS Polymers. “They’re clearly pioneers, if anybody’s in a position to suc-
"YOU SEE GARBAGE..."

"WE SEE ABOVE-GROUND MINES"

Why Mike Biddle, founder of MBA Polymers, sees resource depletion as a major investment opportunity, and why you should too.

WORDS: CHRIS KATON, PUL TRIBRELL
PHOTOGRAPHER: HARRY BODEN
Great Mike, but does the World Really Care?

The 2017 SME Circulars Award

The 2012 Göteborg Award "The Nobel Prize in Environment"

The Audience voted MBA the overall winner from the 7 category winners including Patagonia, Nike, the Scottish Government and others.
Pivot #2, Act 3: What Next?

How Do I Best Leverage What I Learned?

How Do I Continue Working on Stuff I Care About?

Trying to Solve Big and Important Problems

Cool Technology

Other Highly Motivated People

And Let’s not Forget

\[ y = a \cdot b^x \]
Investors Like Curves that Go Up and to the Right

Venture-backed companies with quick $1 Billion valuations


https://ichef.bbci.co.uk/news/1024/cpsprodpb/16A94/production/_87602829_unicornphoto.jpg
The reality is closer to:

And much of CleanTech involves “HardTech” or “ToughTech”

Which means lots of time and money
I believe there are a number of areas with more **URGENT & REAL** exponential growth.
Exponential LOSS vs Growth for many of Earth’s inhabitants

We lose 150 – 200 species every day!


Source: UNITED NATIONS
Might these two dramatic trends be related?

Humans & The Extinction Crisis

Attracted to Tackling Difficult Waste Problems

How About “invisible” wastes?

Might CO₂ and global temperature be related?

Source: https://roadsofstone.com/2007/03/06/140-the-great-global-warming-swindle/
Last 100 or so years

Global Mean Estimates based on Land and Ocean Data

By J. Hansen, Makiko Sato, R. Ruedy, K. Lo, D.W. Lea, and M. Medina-Elizade -
https://data.giss.nasa.gov/gistemp/graphics/, Public Domain,

NASA GISS
The Earth is a REALLY big Mass

The Oceans have been our heat sink up to now

2018 was the ocean's hottest year

Heat Content, $10^{22}$ Joules

The Antarctic ice sheet has been more buffered from warming so far, but that appears to be changing, and would raise the ocean by 60 meters if it melted.

“The Eemian period, between 130,000 and 115,000 years ago, also featured sea levels 6 to 9 meters above current levels, with global temperatures not much warmer than our current era.”


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Climate change could displace up to **200 million people by 2050**, according to the United Nations Institute for Environment and Human Security and the International Organization for Migration

Source: Climatecentral.org

Oceans Under Stress from Many Directions

A LIFETIME OF PLASTIC

The first plastics made from fossil fuels are just over a century old. They came into widespread use after World War II and are found today in everything from cars to medical devices to food packaging. Their useful lifetime varies. Once disposed of, they break down into smaller fragments that linger for centuries.

Growth in Asia
As the economies in Asia grow, so does demand for consumer products—and plastics. Half the world’s plastics are made there. 29 percent in China.

Global plastic production by industry in millions of tons

Legacy of World War II
Shortages of natural materials during the war led to a search for synthetic alternatives—and to an exponential surge in plastic production that continues today.

18 BILLION POUNDS/YR INTO THE OCEANS

JASON TREAT AND RYAN WILLIAMS, NGM STAFF
SOURCE: ROLAND GEYER, UNIVERSITY OF CALIFORNIA, SANTA BARBARA


It’s estimated that this amount of plastic garbage is released to the sea every 15 seconds.

Photo: Vegalante
“More Plastic than fish by 2050”
88 pounds of plastic trash in the stomach of a Cuvier’s beaked whale that washed ashore in the Philippines.

115 plastic cups, four plastic bottles, 25 plastic bags, 2 flip-flops, a nylon sack and more than 1,000 other assorted pieces of plastic in stomach of sperm whale in Indonesia.
Where Else Do We Find Plastics?

Bottled Water  Beer  Sea Salt

Every Corner of the Globe!

Rocky Mountain Snow and Rain

The Alps  Arctic Snow

Bavaria: up to 150,000 particles per liter

Arctic: highest sampling was 14,000 per liter
Where Else Do We Find Plastics?

**Your Poop Is Probably Full of Plastic**

A new study suggests that microplastics routinely show up in our food—and our digestive tracts.

United European Gastroenterology meeting in Vienna, researchers announced they have detected microplastics in stool samples from every single one of a small group of international test subjects – 8 different countries.

https://www.wired.com/story/your-poop-is-probably-full-of-plastic/
Where Do We Want to Go?

Not Here

Towards More Sustainable Business Models and Communities

A Future Where Our Descendants will enjoy all of the *benefits we take for granted*
How do we turn these enormous challenges into opportunities?
Ban Plastics?

“Plastic: The Ocean’s Deadliest Predator”

Campaigns Against Plastic

PLASTIC IS RUBBISH
why we boycott plastic....
Ban Plastics?

Why India Passed One Of The World’s Toughest Anti-Plastic Laws
Would Banning Plastics Lead us to a Better Future?

Plastics are often the most efficient & best environmental materials choice.

Resource efficiency of plastics in the automotive sector
Fender case study: plastics versus traditional materials

- CO₂: Traditional materials 56% more than plastics
- LAND USE: Traditional materials use 85% more land than plastics
- WATER: Traditional materials use 48% more water than plastics
- ENERGY: Traditional materials use 52% more energy than plastics
- MINERAL DEPLETION: Traditional materials deplete minerals 99% more than plastics

Source: Beyond “carbon footprint”: The contribution of plastic products to various resource savings – denkstatt GmbH, Vienna, 2012
Plastics are usually the best alternative from many perspectives

Figure 1: The Environmental Cost of Business as Usual Plastic, Alternatives to Plastic and a More Sustainable Plastic in Consumer Goods

Source: Trucost

We Must Close the Loop

Evolution of Household Waste Recycling
Evolution to Single Stream and MRFs

- PET - rich
- PE, PP - rich
- Mixed plastic residual

- China
- Africa
- SE Asia
- ETC

Material Solutions
Over 180 countries -- not including the US -- agree to restrict global plastic waste trade

By Rob Picheta and Sarah Dean, CNN
Updated 9:39 AM ET, Sat May 11, 2019

Landmark UN plastic waste pact gets approved but not by US

BY THE ASSOCIATED PRESS

GENEVA — May 11, 2019, 5:39 AM ET
The Future will be simpler & more profitable

- Less handling/transport costs
- Economies of Scale
- Larger Markets for Products
- Near Zero Waste

Therefore plastics will be even more Sustainable
Who will turn these enormous challenges into opportunities?
What About the Usual Suspects?

Government and NGOs?

Industry, Large Companies?

SMEs (Small to Medium Enterprises)?

Individuals?
Big companies?

Reduction of $\text{CO}_2\text{e}$

- 1,000,000 MT from 2008-2014
- 167,000 MT per year on average
- 1 MT/yr per Unilever employee

CEO Polman: 'Unilever Sustainable Living Plan', a blueprint that will lead to company **doubling in size** while halving its carbon footprint.

2014 GlobeScan/ SustainAbility Survey
Reduction of CO$_2$e

182,000 MT from 2007-2013

26,000 MT per year on average

2 MT/yr per CCE employee
Individuals?

What Can Individuals Really Do?

“Everyone thinks of changing the world, but no one thinks of changing himself.”

-Leo Tolstoy
Individuals?

Only 4 lifestyle changes

- ~10 going solar
- ~4 using bikes & trains more than cars
- ~3 air-drying clothes
- ~4 going mostly vegan

~21 MT/yr for 1 family
>5 MT/yr per person

RT flight to DEN! (coach)

~ (0.5)
SMEs? – How many of you are SMEs?

“Never doubt that a small group of thoughtful, committed, citizens can change the world. Indeed, it is the only thing that ever has.”

Margaret Mead
Over 90,000 MT/yr CO2 savings
Approx. 900 MT CO2 savings/employee!
Channeling some California messaging

"The ones who are crazy enough to think, that they can change the world, are the ones who do."

Steve Jobs

Your life is your message to the world. Make sure it's inspiring.
Additional Resources

Plastics Recycling TED talk: http://on.ted.com/j07ad

3 minute BIG SHFT video: http://tinyurl.com/cpee3vw


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