

Plastics, Climate Change and Local Policy

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Solana Beach ECO Rotary Club

Overview

- Plastic Production & Climate Change
- Solana Beach Single-Use Plastic Restrictions Ordinance 504;
- Plastic Water & Beverage Bottles

Production, use, and fate of all plastics ever made

SCIENCE ADVANCES | RESEARCH ARTICLE

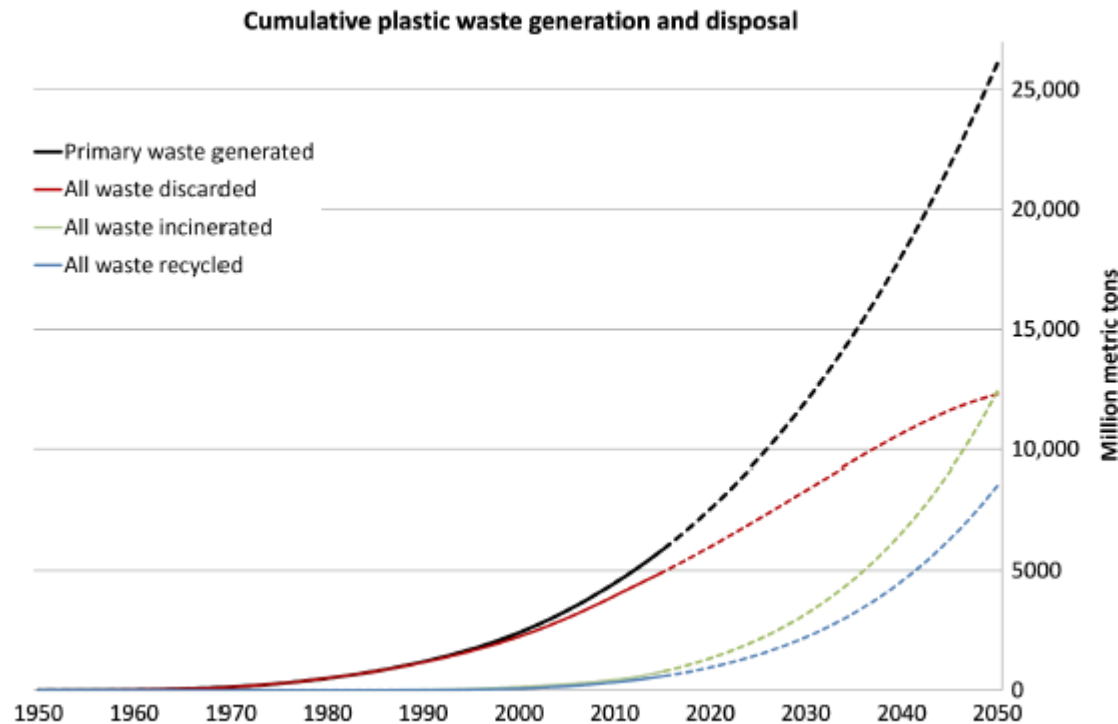


Fig. 3. Cumulative plastic waste generation and disposal (in million metric tons). Solid lines show historical data from 1950 to 2015; dashed lines show projections of historical trends to 2050.

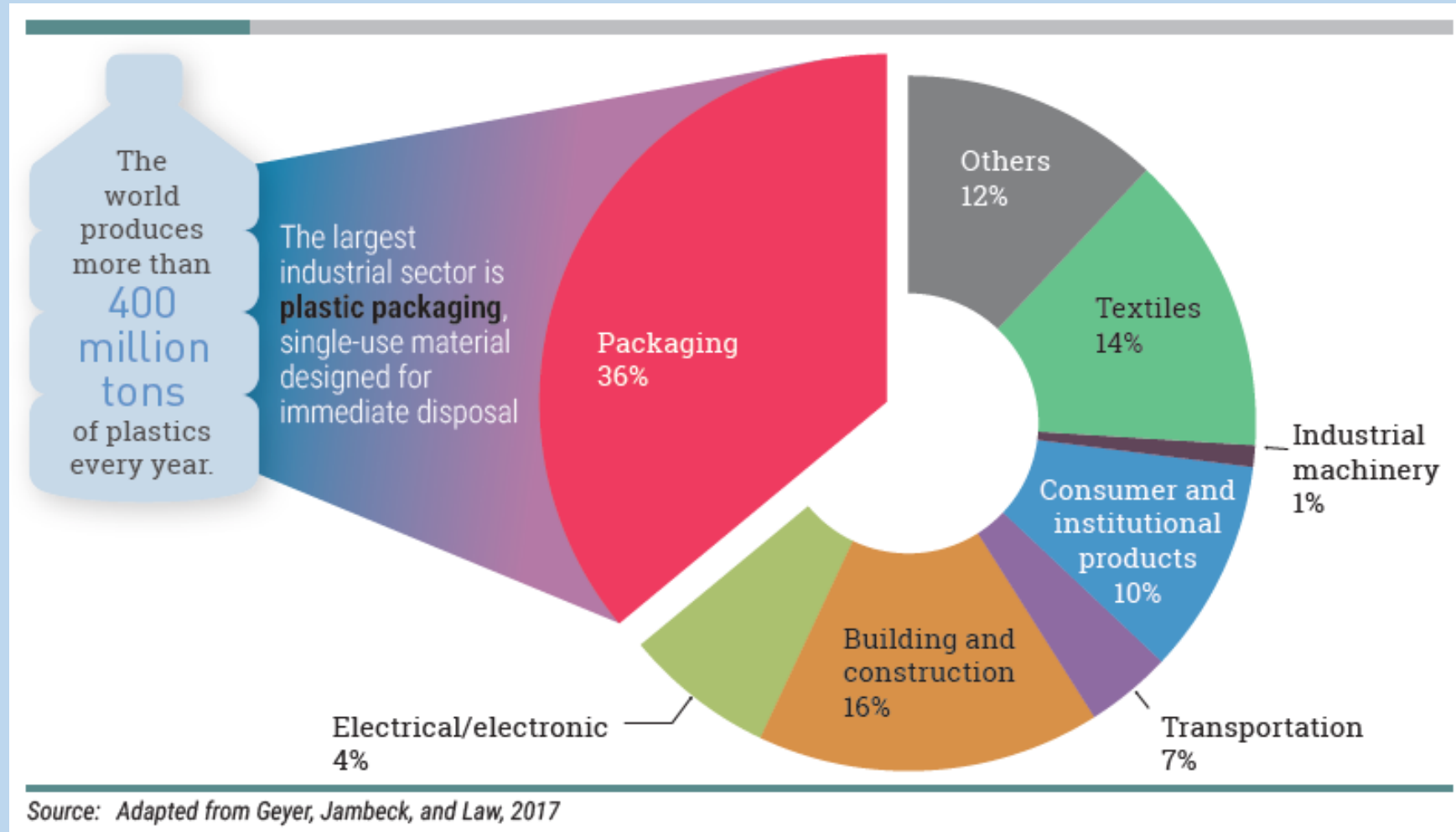
8300 MMt virgin plastic produced to date.

As of 2015, 6300 MMt of plastic waste generated.

Of this

- ~9% recycled
- 12% incinerated &
- 79% accumulated in landfills or natural environment.

Global Plastic Production by Industrial Sector



Effects on Marine Ecosystems

Marine litter: A mammoth challenge for our oceans



By 2050, an estimated
99%
of seabirds will have ingested plastic

Marine litter harms over
600
marine species

15%
of species affected by ingestion &
entanglement from marine litter are
endangered

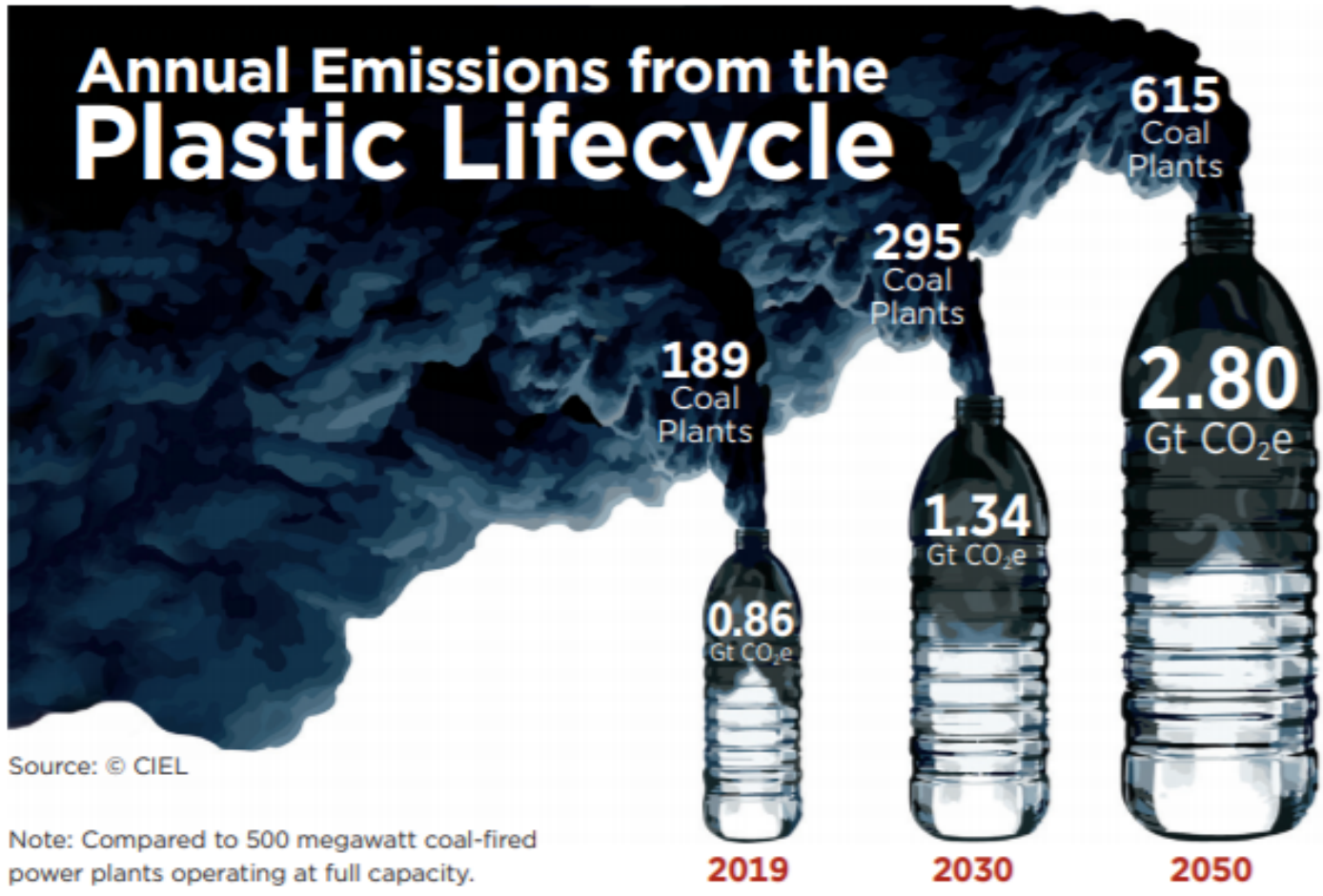
#CleanSeas



Microplastics doubling every 15 years

Plastics & Climate Change

Emissions from the Plastic Lifecycle



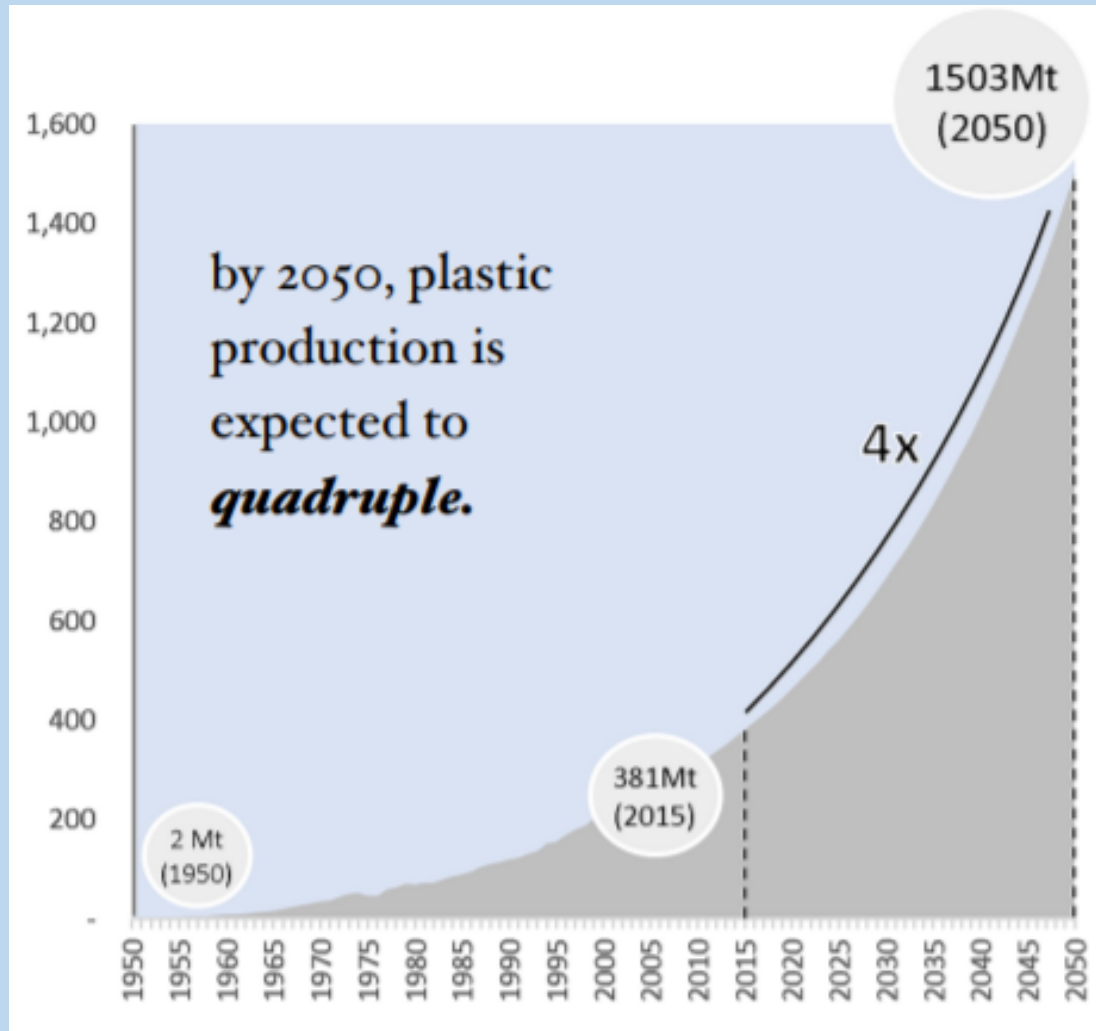
- Contributes to GHG via materials extraction, product production and waste disposal.
- Production currently responsible for 6% of global oil demand and 20% by 2050 if trends continue. (WEF)
- By 2050 GHG from plastic could account for 10-13% of the carbon budget for a 1.5°C rise. (CIEL)

Plastics & Fossil Fuels



Fossil fuels — oil, gas, and coal — are the primary materials from which almost all plastics are made.

Global Plastic Production Growth Rate;



Put simply: the natural gas boom in the US has made plastic feedstocks really, really cheap.

The American Chemistry Council projects the chemical industry will spend \$164 billion on 264 new plastics facilities or expansion projects by 2023.

DONALD TRUMP - Published August 13

Trump promotes Pennsylvania plant built to turn natural gas deposits into plastics

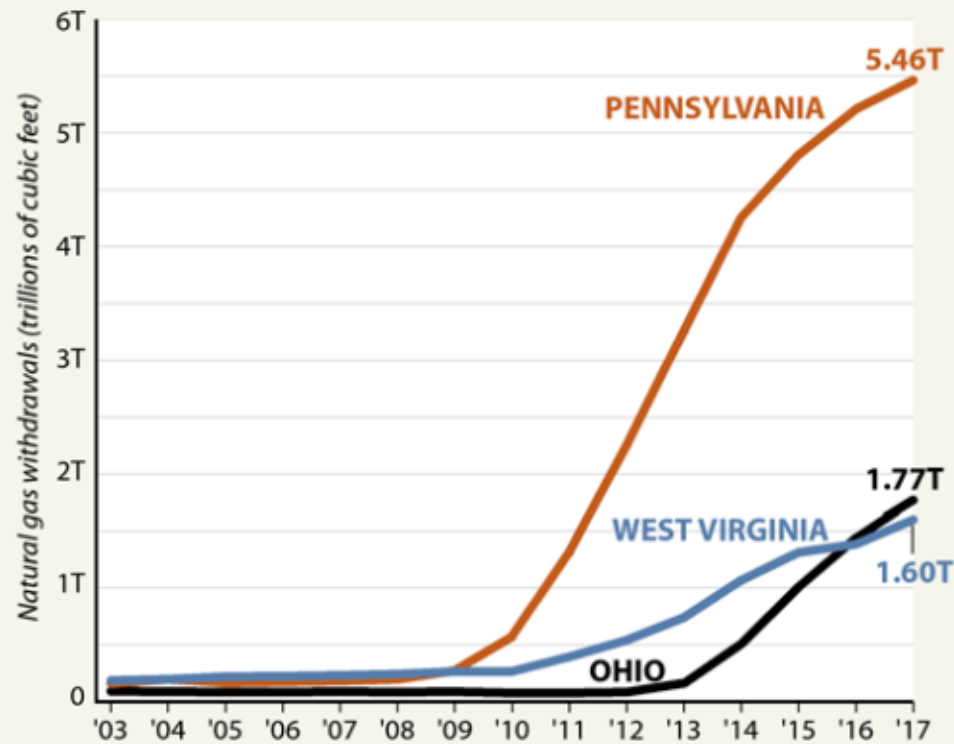
Plastics, The New Coal in Appalachia ?

3 States' Natural Gas Boom

In the shale regions of Ohio, Pennsylvania and West Virginia, developments in hydraulic fracturing techniques, or fracking, fueled a natural gas boom over the past decade. Some of that natural gas is feeding a growing plastics industry in the region.

NATURAL GAS PRODUCTION

Ohio, Pennsylvania and West Virginia, in trillions of cubic feet, 2003-2017

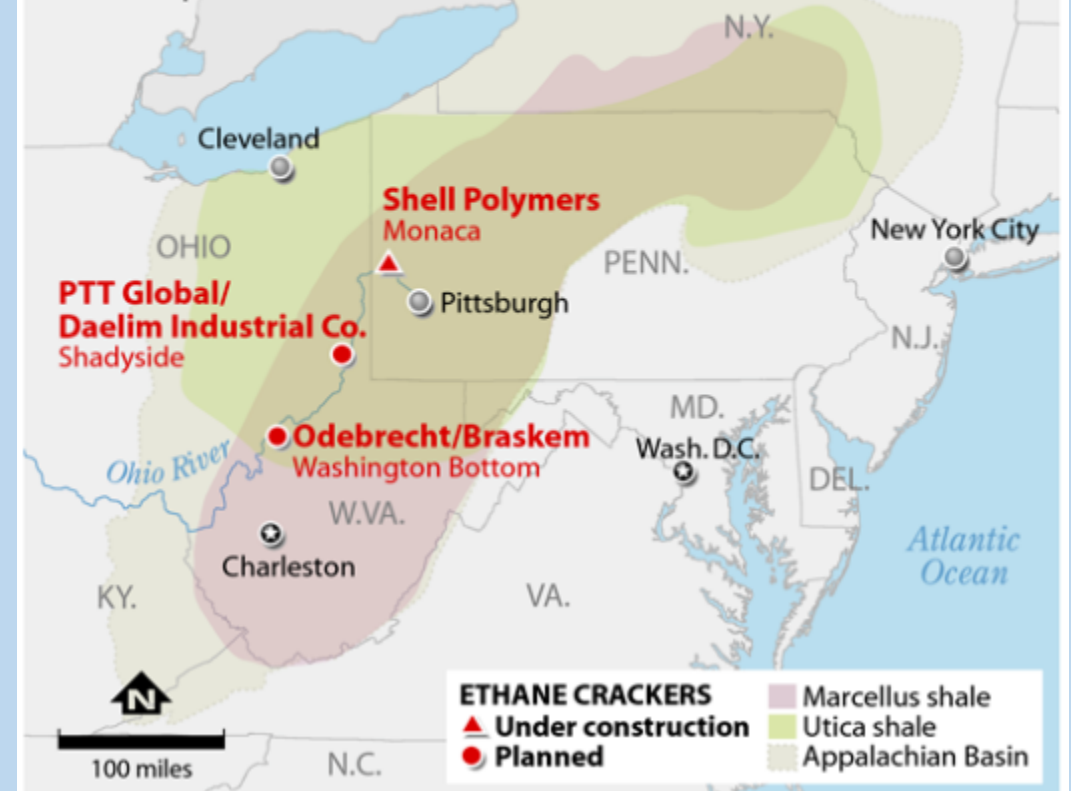


SOURCE: U.S. Energy Information Agency

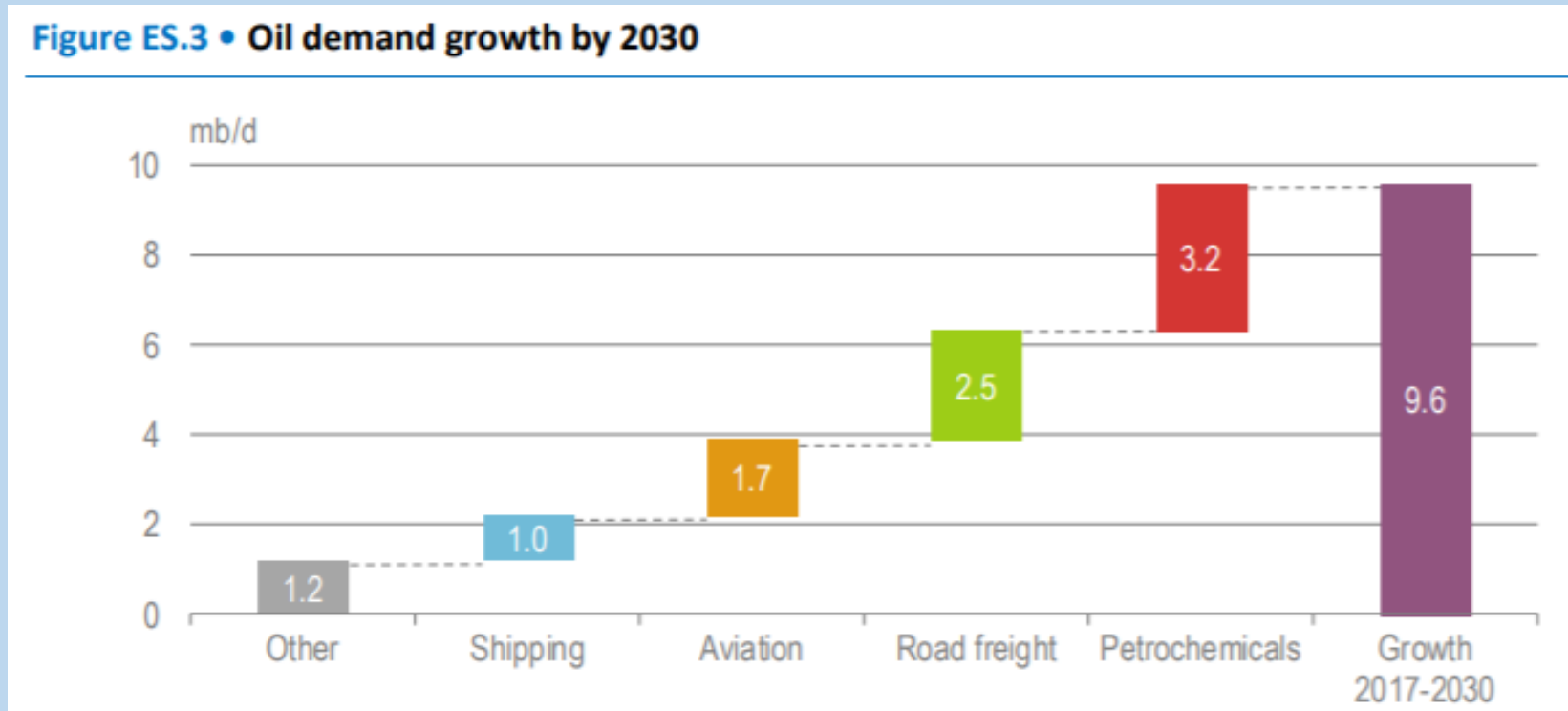
PAUL HORN / InsideClimate News

Ethane Cracker Plants on the Ohio River

Cracker plants take ethane, a liquid natural gas byproduct, and "crack" the molecules to produce ethylene, a root chemical used to manufacture a variety of plastics products. One sprawling cracker plant is under construction along the upper Ohio River and two more are planned.



Petrochemicals - largest driver of global oil consumption



From – IEA, The Future of Petrochemicals (2018)

Solana Beach Climate Action Commission (CAC)

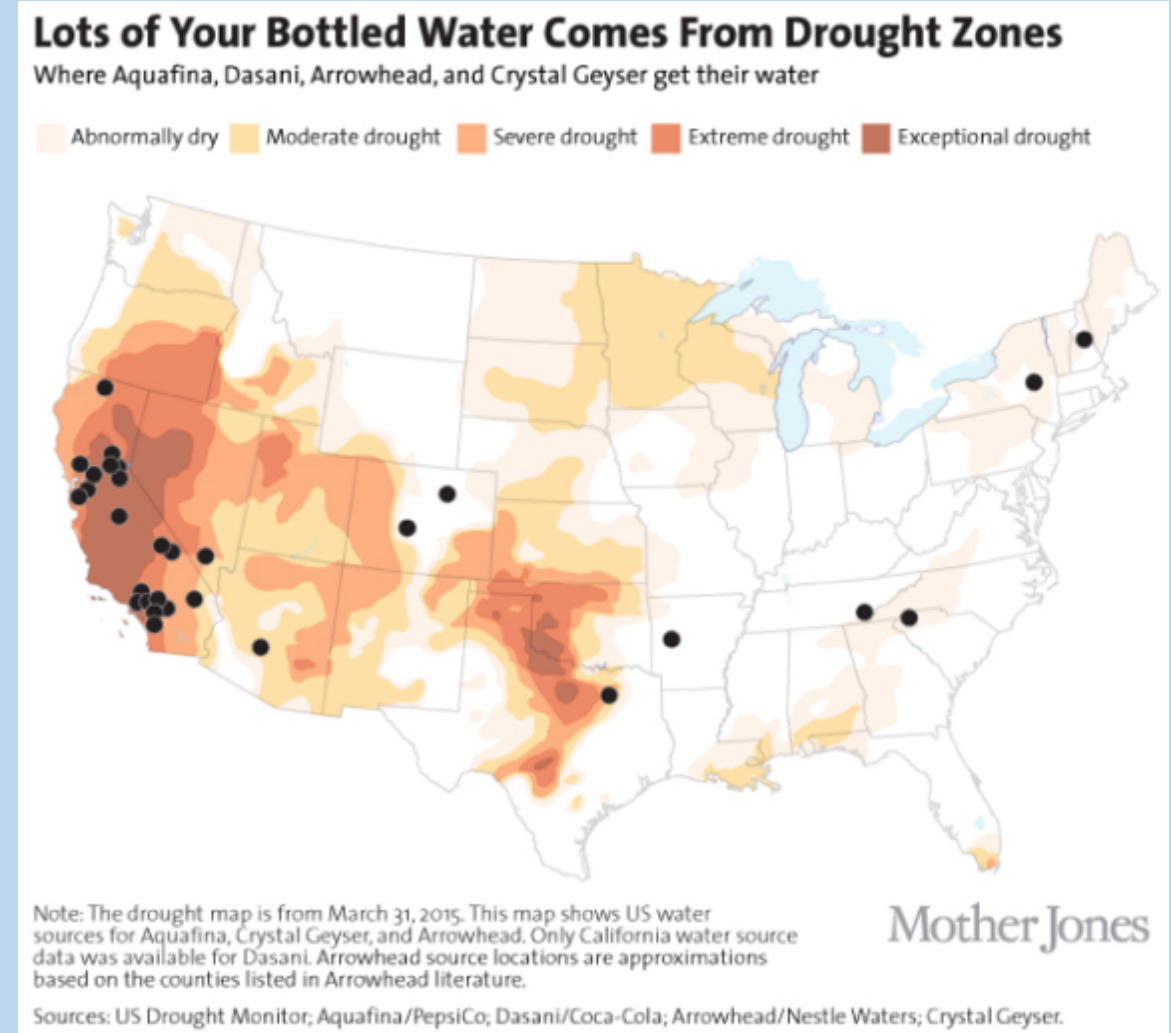
- CAC established November 2015
- Commission makeup = 9 members including 2 current Council members and two professionals from the scientific or environmental community.
- Develop Climate Action Plan, help implement, monitor and ...
- First Climate Action Plan adopted July 2017
- Measure W-1 - Divert waste from landfill
- Single Use Plastics Ordinance approved Sept 2019

Ordinance 504 Measures

- 1) **Reusable Cups** – Restaurants & Food Vendors to accept reusable cups. Must be appropriately sized, sanitary and comply w/ CA health and safety code amendments.
- 2) **Polystyrene Foam** – (e.g. coolers, ice chests, beach toys not encased in hard plastic)
Restrictions on sale and distribution in City and prohibition on use on City beaches.
Restrictions on composition of meat & fish trays and egg cartons to start in 2021.
- 3) **Food Service Ware & Accessories** – (e.g. plastic straws, utensils, stirrers, splash sticks, cocktail sticks or toothpicks)
Restrictions on sale and distribution; Items provided upon request.
- 4) **Plastic Bottles & Packaged Water** - Prohibits sale and distribution of packaged water and bottled beverages of 1 liter or less on City property and/or City events.

Bottled Water Considerations

- 8 out of 10 plastic water bottles end up in landfill or natural environment
- 64% of all bottle water sales are single serving (<500ml)
- ~ two thirds of all bottled water sold in the United States is repackaged tap water.
- ~2000x more energy required for bottled than tap
- Health – not necessarily
- Convenience – for sure!
- Location – See graphic →



The Real Costs of Bottled Water

ECONOMIC COSTS

COST OF WATER ITSELF <0.001%

PRODUCTION 10%

PACKAGING 5%

SALES & MARKETING 20%

DISTRIBUTION 20%

RETAILER MARK UP 30%+

\$1.29
(retail average)



ENVIRONMENTAL COSTS

WATER

It takes 3x the amount of water to produce one bottle of water

CO2

5 ounces CO2 produced for every 1 ounce of PET

OIL

1/4 bottle full of oil is used to fill, transport, cool, and dispose of 1 bottle

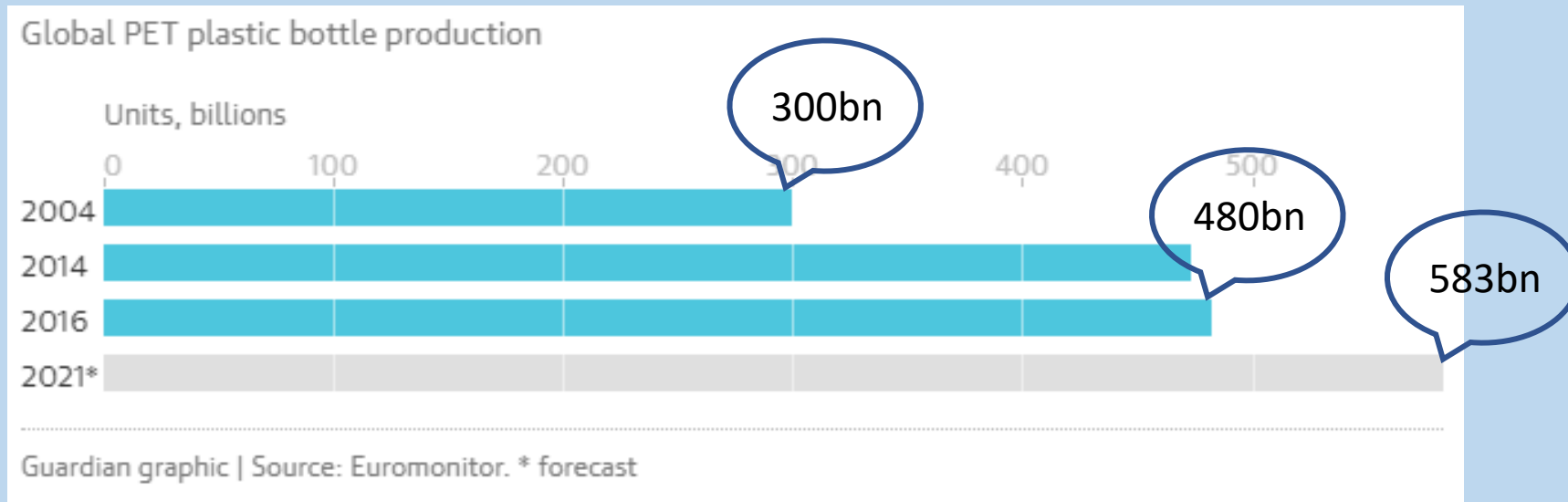
Resulting in 15-20% profits...for a bottle often with a product cost of less than \$0.00001

Bottled Water Cost Comparison



So What About Plastic Beverage Bottles?

- ~ 20,000 plastic bottles produced every second
- In 2016, < 50% were collected for recycling and only 7% of that was turned into a new bottle.
- 1 million plastic bottles bought every minute worldwide – purchase to increase by 20% by 2021



Why Recycling is Not the Solution

- Recyclable \neq Recycled
- Production uses colorants, additives, fillers, & different materials making it hard to recycle, or not recyclable at all.
- Contamination, yield loss, & shortening of polymers
- Producers flooding market w/virgin plastic that outcompete recycled in cost and quality
- Incineration (plastic-to-energy) competes with recycling
- Most recycled plastics are down-cycled. – still using plastics
- Economics don't work - Recycling centers closing.

REPLANET: CALIFORNIA'S LARGEST RECYCLING
CENTER CHAIN CLOSES

Exclusive: Annual consumption of plastic bottles is set to top half a trillion by 2021, far outstripping recycling efforts and jeopardising oceans, coastlines and other environments

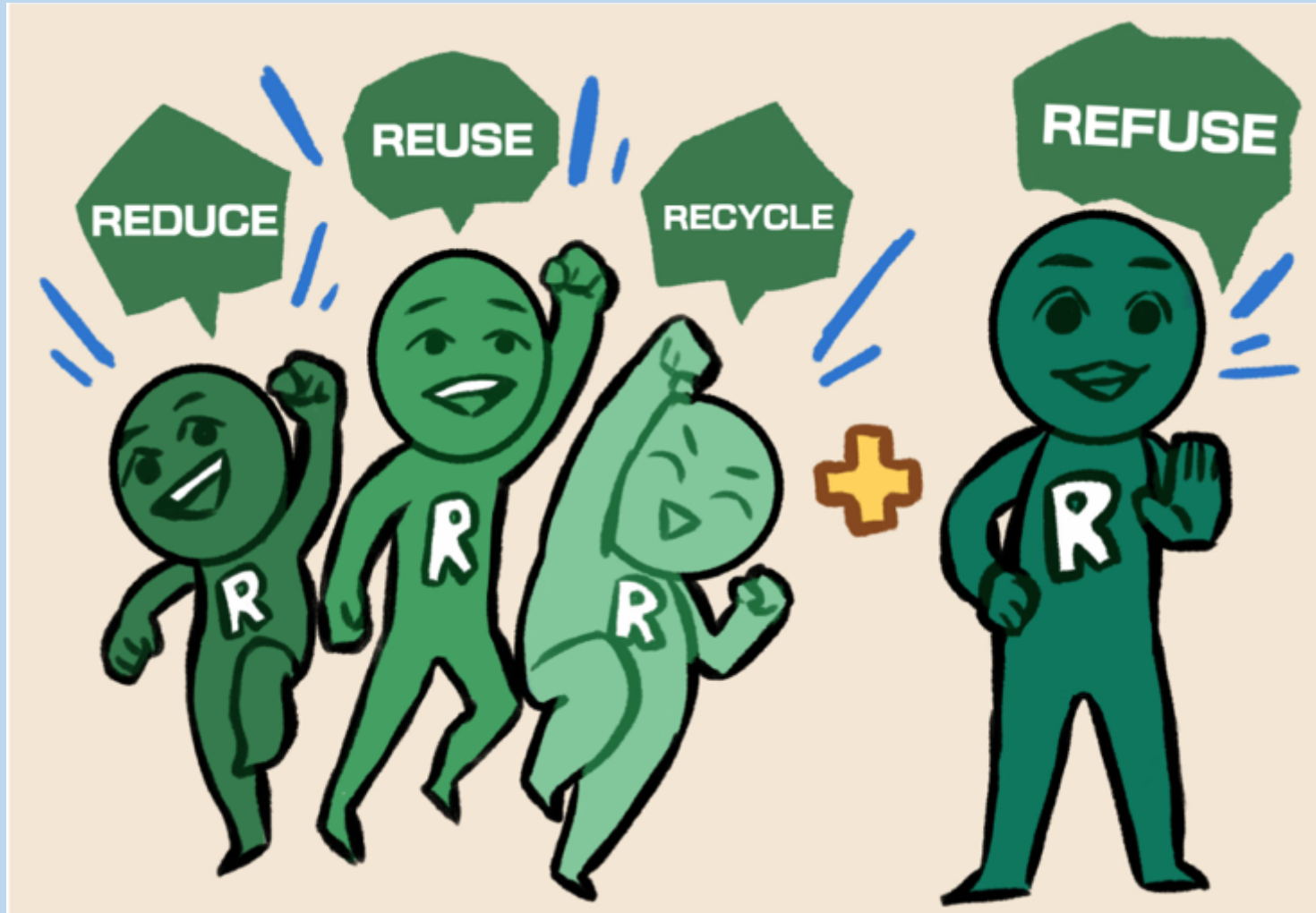


[The Guardian](#) (2017)

Single-Use Bottle Alternatives



Share the Message



(Danielle Evangelista / Daily Titan)

Questions?