Understanding the Health Consequences in Maryland of Electricity Produced From Fossil Fuel

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WHY WE ARE HERE

Blueprint of Forest City
China 2017
FOSSIL FUELS
and
CLIMATE CHANGE
KEELING CURVE

Latest CO₂ reading
November 07, 2017
403.97 ppm

CLIMATE CHANGE OCCURRING MORE RAPIDLY THAN PREVIOUSLY THOUGHT

- Record Surge in Atmospheric CO2 seen in 2016
  - WMO GHG Bulletin
- Temperature warming 140% higher than thought in the 1980s
  - Mears & Wentz 2017
- Greenland Ice is Melting Faster than Thought
  - Khan et al 2016
- Earth’s oceans are warming 13% faster than thought
  - Cheng et al 2017
- Multi-meter sea rise could happen within a matter of decades, rather than centuries as previous estimates suggested
- Extrapolations of recent observed data suggest a largely ice-free summer ocean by the late 2030s, which is earlier than projected by most climate models
  - SWIPA 2017 Assessment
MARYLAND EFFECTED MORE BY SEA LEVEL RISE THAN OTHER AREAS

Figure 7.3. Relative sea level rise during the later 20th century along the U.S. Atlantic coast compared to the global mean sea level rise during 1961-2003 (band represents the confidence limits around the mean).
Detecting Climate Change in Chesapeake Bay
When Rising Seas Hit Home

(Chronic inundation in 22 communities by 2035, 17 more by 2100)

Union of Concerned Scientists, USA
HAPPY HOUR, April 22nd

ANOTHER MUDSLIDE!
I'LL HAVE A DARK AND STORMY!
ONE MORE HURRICANE!

HOW CLIMATE CHANGE SCIENTISTS DROWN THEIR SORROWS.
FOSSIL FUEL USE in MARYLAND
MARYLAND’S ELECTRICITY PROFILE 2015

Maryland.Gov
Open Data Portal

Coal 38%
Nuclear 40%
Natural Gas 12%
Hydro 4.4%
MARYLAND’S ELECTRICITY PROFILE 2006

Coal 60%
Nuclear 23%
Natural Gas 3%
Hydro 4.4%
PJM Energy Mix
Nov 8 2017

Generation Fuel Mix
As of 9:00 a.m. EPT

Total: 94,077 MW
Renewables: 2,843 MW

Coal 28%
Natural Gas 35%
Nuclear 32%
FOSSIL FUELS
and
HUMAN HEALTH
AIR POLLUTION and HUMAN HEALTH

6 Criteria Pollutants- NOx, SO2, O3, PM 2.5, PM 10, CO

DEATHS RELATED TO OUTDOOR AIR POLLUTION - BREAKDOWN BY DISEASE

- Lung cancer: 3%
- Acute lower respiratory infections in children: 6%
- Chronic obstructive pulmonary disease (COPD): 11%
- Ischaemic heart disease: 40%
- Stroke: 40%

TOXIC EMISSIONS
(84 of the 187 Toxic Pollutants come from Coal)

“Mercury is a potent neurotoxin, and every thermometer that contains it is a potential environmental threat. In the 21st century, however, that is a risk that no one needs to take....” -NIST
AIR POLLUTION and HUMAN HEALTH
6 Criteria Pollutants- NOx, SO2,O3,PM 2.5, PM 10, CO

Cardiovascular System
- Higher Cardiovascular Mortality
- Hypertension
- More MI (Heart attacks) on days of higher pollution
- Atrial Fibrillation
- Increased rates of out of hospital cardiac arrests
- AHA Statement in 2010 on Particulate pollution and a Causal relation to CV mortality

Respiratory System
- Decrease in Lung Capacity
- Decreased exercise capacity
- Increased rates of hospital admissions for Asthma
- Increased rates of hospital admissions for COPD
- Increased Respiratory related mortality
- Lung Cancer

Central Nervous System
- Stroke
- Parkinson’s Disease
- Alzheimer’s Dementia
- Autism

Renal
- Worse outcomes in patients on hemodialysis
- Worse outcomes in renal transplant patients
- Direct Renal Injury

Reproductive System
- Infertility in Women
- Lower Sperm Quality in Men
- 80,000 Stillbirth per year

Endocrine System
- Type II Diabetes

Psychiatry
- Depression
WATER POLLUTION

Energy Water Interface

Great Water grab,
Greenpeace
TOXIC WATER POLLUTION

Coal Ash, PSR

Figure 1. Health Impacts of Coal Toxicants

- **Mercury**: Mercury poses particular risk to children, infants, and fetuses. Impacts include nervous system damage and developmental defects like reduced IQ and mental retardation.

- **Lead**: Exposure to lead can result in brain swelling, kidney disease, cardiovascular problems, nervous system damage, and even death. It is accepted that there is no safe level of lead exposure, particularly for children.

- **Chromium**: Ingestion of chromium can cause stomach and intestinal ulcers, anemia, and stomach cancer. Frequent inhalation can cause asthma, wheezing, and lung cancer.

- **Arsenic**: Ingestion of arsenic can lead to nervous system damage, cardiovascular issues, and urinary tract cancers. Inhalation and absorption through the skin can result in lung cancer and skin cancer, respectively.

- **Boron**: Inhalation of boron can lead over the short-term to eye, nose, and throat irritation. Ingestion of large amounts, however, can result in damage to the testes, intestines, liver, kidneys, and brain, and eventually lead to death.

- **Selenium**: Selenium is used in many bodily functions, but deficiencies or excesses can be bad for one’s health. Excess intake of selenium can result in a host of neurological effects, including impaired vision and paralysis, and even death.

- **Other Toxicants**
  - **Antimony**: Eye, skin irritation, stomach pain, ulcers, lung disease
  - **Cadmium**: Emphysema, kidney disease, hypertension, lung cancer
  - **Molybdenum**: In animals: slowed growth, low birth weight, infertility
  - **Thallium**: Nervous system damage, lung, heart, liver, kidney problems

*Children are particularly at risk

Kingston Coal Ash Spill

Fact Sheet

EATING FISH FROM THE ANACOSTIA RIVER

Even clean looking Anacostia fish are not safe to eat.

Attention fishermen: There are health risks if you eat fish from the Anacostia River.
What about Natural Gas?

Fracking isn’t safe, and scientists know it.

PERCENT OPPOSED TO INCREASED FRACKING

51% U.S. ADULTS
66% SCIENTISTS
73% BIOLOGISTS/MEDICAL SCIENTISTS

Science says #Don'tFrackMD

The Health Effects of Fracking
Fracking Harms Human Health

Rapidly Growing Evidence

A growing body of scientific information suggests that unconventional gas development and production (UGDP), commonly referred to as “fracking,” has a broad array of negative impacts, ranging from adverse climate effects to earthquakes to community disruption to contamination of air, water and soil. These contaminants can then enter the human body through skin contact, respiration or ingestion, potentially leading to a wide range of health harms.

The peer-reviewed scientific literature now includes more than 700 studies on the impacts of unconventional gas development; most were published in just the last three years. Of the studies looking specifically at health impacts, more than 80 percent document risks or actual harms.1

Fracking’s Adverse Impacts

Recent studies in the peer-reviewed literature are of vital importance, both from a clinical’s perspective and a policy perspective. These studies include:

- In October 2015, researchers at the Johns Hopkins Bloomberg School of Public Health and collaborating institutions analyzed data from roughly 10,000 birth records in Pennsylvania and found a statistically significant association between maternal proximity to active fracking operations and premature births and high-risk pregnancies.2
- In July 2016, researchers at the Johns Hopkins Bloomberg School of Public Health and collaborating institutions analyzed medical records of more than 35,000 asthma patients, ages five to 90 years old, and found a statistically significant association between proximity to active fracking operations and mild to severe asthma exacerbations.2
- In August 2016, researchers at the Johns Hopkins Bloomberg School of Public Health and collaborating institutions analyzed responses to questionnaires received from more than 7,000 adult primary care patients in central and northern Pennsylvania, and found statistically significant associations between proximity to active fracking operations and various combinations of migraine headaches, chronic rhinosinusitis and fatigue symptoms.2

Most reports about fracking in Maryland focus on the impacts in Western Maryland. However, natural gas deposits are located throughout Maryland, including in St. Mary’s, Calvert, Dorchester, Talbot, Caroline, Queen Anne’s, Wicomico, Somerset, Worcester, Frederick and Montgomery counties.
**CLIMATE CHANGES HEALTH**

**Lancet Countdown 2017**

- **Coal phase-out**: Coal is the largest contributor to greenhouse gas emissions of all fossil fuels, causing severe air pollution and affecting human health. While coal use increased globally since 1990, it appears to have peaked in 2014 and is now declining.

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<td>Coal use (TWh)</td>
<td>285</td>
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<td>310</td>
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- **Labour capacity and heat stress**: "Extreme heat causes heat stress and heat stroke, exacerbations of pre-existing heart failure, and kidney disease." Global labour capacity of tropical labourers, such as farmers, has fallen by 3%–5% from 2000 to 2016 due to rising temperatures and the inability to work when it's too hot.

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
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<td>Labour capacity (hours)</td>
<td>290</td>
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- **Divestment from fossil fuels**

  Investment and pension funds of Health sector institutions are increasingly being withdrawn from fossil fuels to keep with the ethos of the medical profession.

  - **$1.24 trillion**: 2016 divestment commitment across all sectors
  - **$5.45 trillion**: Sum of divestment from all sectors
  - **$2.4 billion**: Sum of divestment from health institutions

- **Climate Change**

  **Global Change.gov**
THE WAY FORWARD