



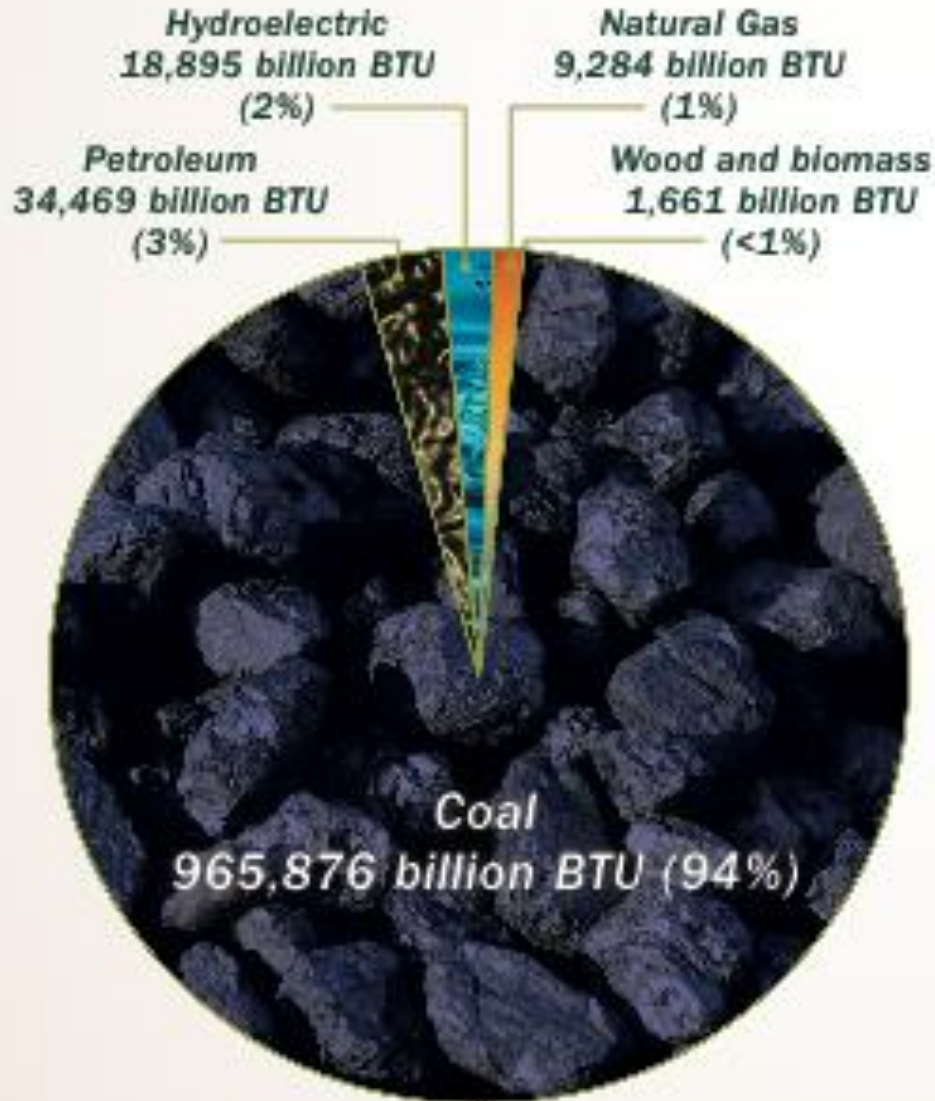
Health Impact Assessment of Coal and Clean Energy Options in Kentucky

By Elizabeth Walker, PhD
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Kentucky Electric Power Sector Energy Consumption 2008¹

TOTAL: 1,030,185 billion BTU (100%)





Kentucky's Clean Energy Opportunity Act, HB 167



- Renewable and Efficiency Portfolio Standard requiring utilities, through gradually increasing incremental goals, to ramp up to obtaining 12.5% of their retail sales from renewable sources and offsetting 10.25% of annual retail sales through energy efficiency by 2021.
- Provision to establish Feed-in Tariffs for in-state renewable energy production (wind, solar, hydro, biomass) to jumpstart Kentucky's clean energy market.

Coal life cycle

UNDERGROUND MINING

- ▶ Silicosis
- ▶ Injuries
- ▶ Mortality

COMBUSTION

- ▶ NO_xs and SO_xs
- ▶ O₃ and brown haze
- ▶ Particulates
- ▶ Mercury
- ▶ CO and CO₂

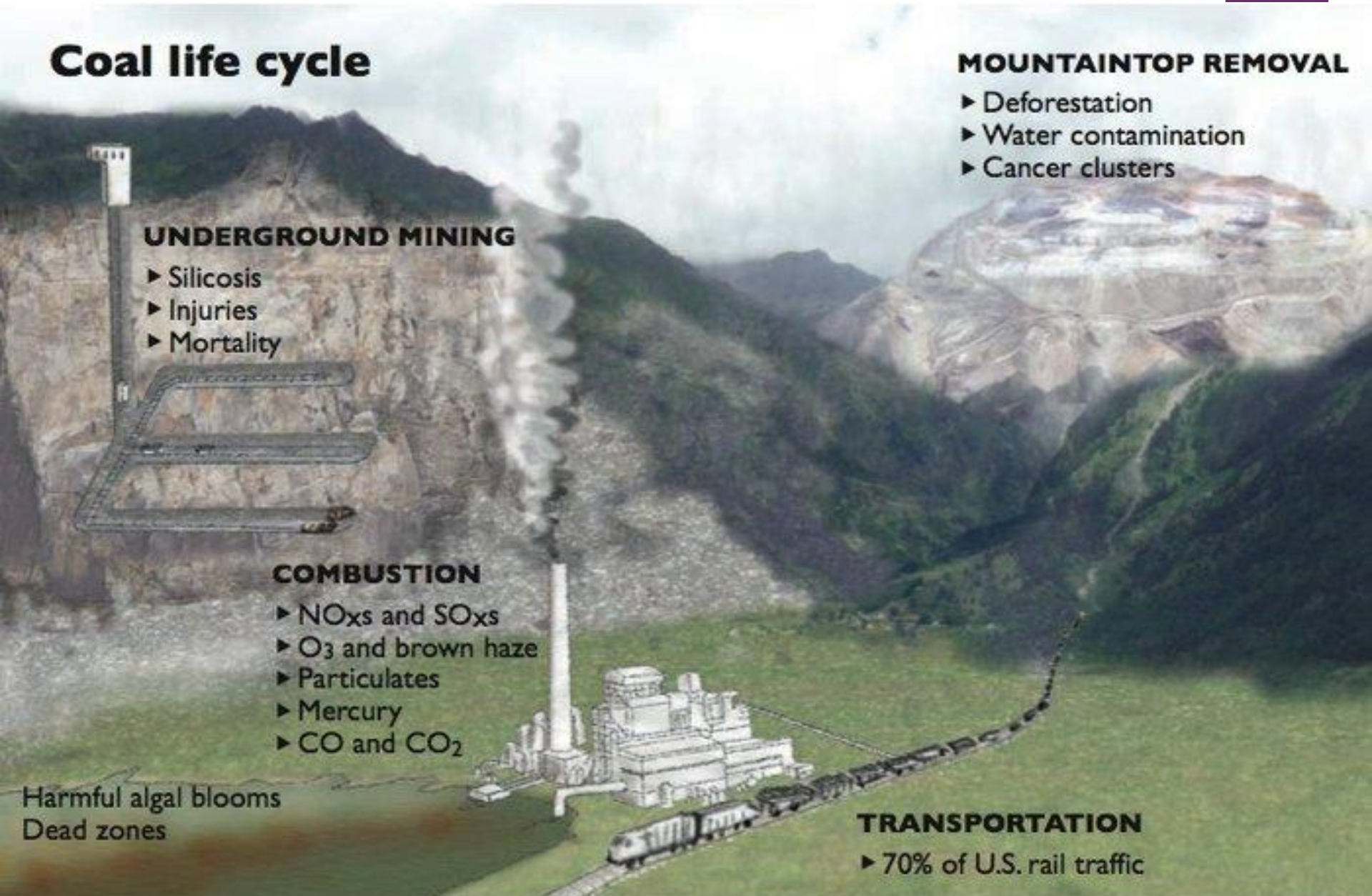
MOUNTAINTOP REMOVAL

- ▶ Deforestation
- ▶ Water contamination
- ▶ Cancer clusters

TRANSPORTATION

- ▶ 70% of U.S. rail traffic

Harmful algal blooms
Dead zones



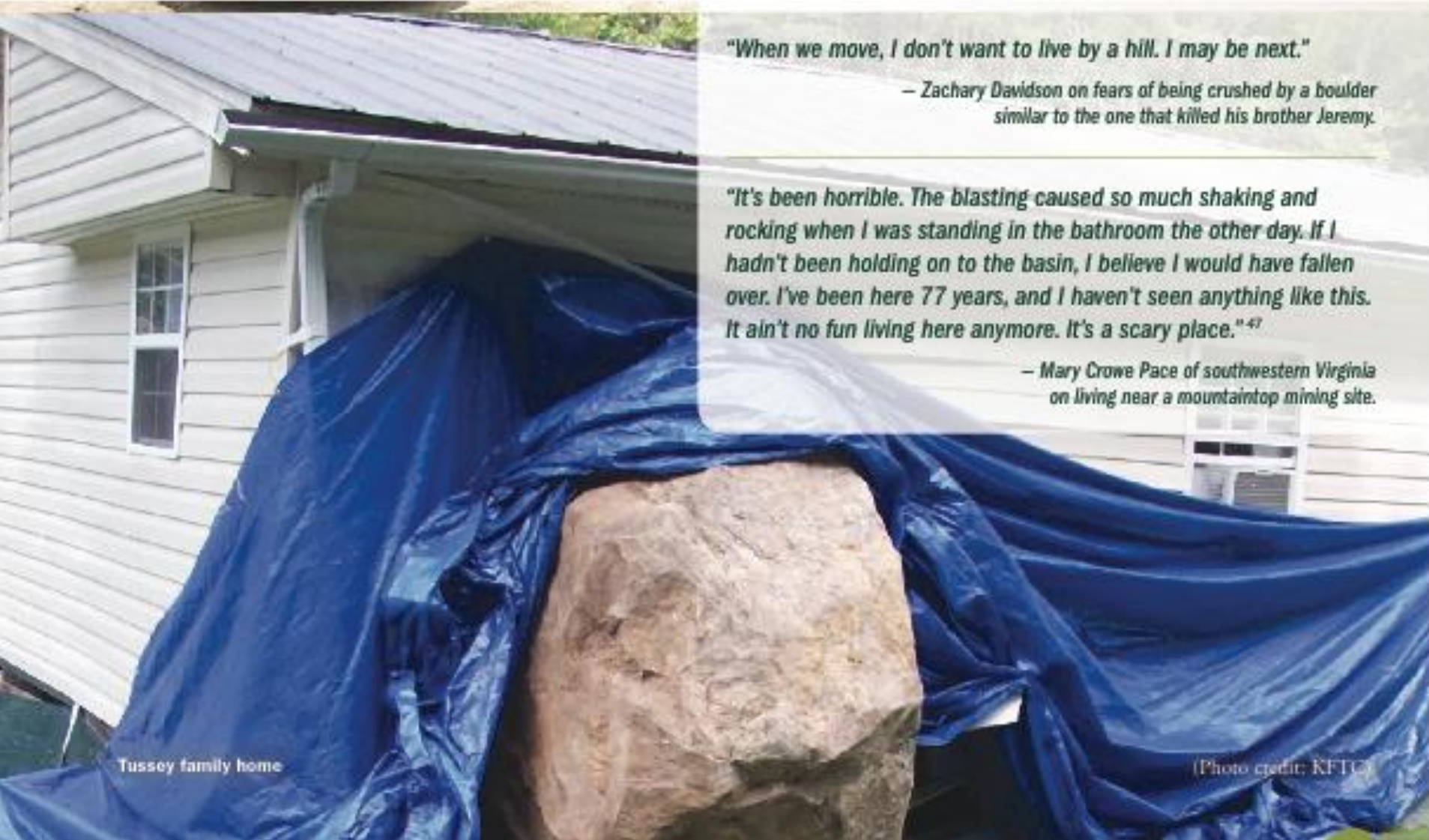
Health Impacts of Kentucky's Energy Portfolio

- **Coal Mining:**
 1. Surface Mining
 2. Deep coal mining
- **Coal Processing and Transportation**
- **Power Plant Emissions**
- **Coal Waste**
- **Energy Efficiency and Renewable Energy**

Example: Surface Mining



Qualitative information gathering: quotes and images



"When we move, I don't want to live by a hill. I may be next."

– Zachary Davidson on fears of being crushed by a boulder similar to the one that killed his brother Jeremy.

"It's been horrible. The blasting caused so much shaking and rocking when I was standing in the bathroom the other day. If I hadn't been holding on to the basin, I believe I would have fallen over. I've been here 77 years, and I haven't seen anything like this. It ain't no fun living here anymore. It's a scary place."⁴⁷

– Mary Crowe Pace of southwestern Virginia on living near a mountaintop mining site.

Tussey family home

(Photo credit: KFTC)

Water quality concerns: limited access to clean water, increased rates of cancer, higher rates of birth defects, reduced quality of life.

Beverly May displays contaminated drinking water from her house in Wilson Creek, KY



Summary of Health Impacts of Mountaintop Mining

Health Determinant	Effects on Health	Population at Risk	Evidence of Health Determinant's Impact on Health
Contaminated air	<ol style="list-style-type: none"> 1. cancer 2. kidney disease 3. birth defects* 4. low birth weight* 5. tooth decay 6. increased mortality rates 7. gall bladder disease 	Communities consuming well water near MTM sites	<ol style="list-style-type: none"> 1. Hendryx (2010), Hitt (2010) 2. Hendryx (2009) 3. Ahern (2011) 4. Ahern (2010) 5. Loo (2003) 6. Hendryx (2008) 7. Neithercut (1989), Shukla (1998), Minton (2011)
Contaminated water	<ol style="list-style-type: none"> 1. respiratory disease 2. cardiovascular disease 3. birth defects* 4. low birth weight* 	Communities living near MTM sites, children, elderly, individuals with asthma and COPD	<ol style="list-style-type: none"> 1. Hendryx (2009), Knuth (2010), Brabin (1994) 2. Hendryx (2009), Esch 3. Ahern (2011) 4. Ahern (2010)

Summary of Health Impacts of Mountaintop Mining (cont)

Health Determinant	Effects on Health	Population at Risk	Evidence of Health Determinant's Impact on Health
Degraded living environment	<ol style="list-style-type: none"> 1. poorer quality of life 2. poorer test scores 3. increased health disparities 	Communities living near MTM sites, school children	<ol style="list-style-type: none"> 1. Zulig (2010, 2011) 2. Cain (2010) 3. Hendryx (2011)
Flooding	<ol style="list-style-type: none"> 1. loss of life, 2. loss of property, 3. injury 	Communities living below MTM sites	<ol style="list-style-type: none"> 1. Buchanan (2011) 2. Estep (2011) 3. Palmer (2010)
Detonation of Explosives	<ol style="list-style-type: none"> 1. psychological stress, 2. loss of life, 3. damage to housing, 4. exposure to toxic gasses, 5. elimination of water sources through fracturing of water tables 	Communities living near MTM sites	<ol style="list-style-type: none"> 1. Nater (2011), Thoits (2010) 2. Morell (2005) 3. Cooper (2009) 4. Mainiero (2007) 5. Withrow (2011)



Emissions: Effects on Asthma and Cardiac Health



- Approximately **1 in 10** Kentuckians suffer from asthma
- Kentucky hospitals saw over **7,150** asthma patients in 2002
- hospital expenses averaged **\$6053**
- In KY 539 heart attacks and 412 cardiac deaths caused by coal plant PM2.5 annually.

Health Impacts of Energy Efficiency

■ 2006 California Study:

- Adding fiberglass attic insulation to electricity-heated homes would result in four-fold reduction in disease burden caused by PM_{2.5}.



+ Safer, healthier employment



- Shifting to renewable energy generation utilizing sources such as wind and solar could **improve the health of 700,000 US workers** and potentially **eliminate 1,300 worker deaths** over the coming decade due to reduced risk in the energy extraction phase. (Sumner)

Health Determinant	Effects on Health	Affected Population	Evidence of health determinant's impact on health
Wind Turbines	Negligible affect on health	Those living near wind turbines	MN Dept of Health, Env Health Division, Natural Resource Council
Wind Turbines: Zero Emissions during energy production	Reduced lung and heart disease	All Kentuckians	All research pertaining to particulate matter
Solar panels: production	Silicosis	Silica miners	Fthenakis, Electric Power Research Inst.
Solar panels: Energy production	Reduced lung and heart disease	All Kentuckians	All research pertaining to particulate matter
Biofuel	Heart attack, arteriosclerosis, ischemic and hemorrhagic stroke	All Kentuckians	Peters Brook Wellanius
Hydro Electricity: Plant operation	Occupational safety hazards	Plant operators	Fairchild
Hydro Electricity: Energy Production	Reduced lung and heart disease	All Kentuckians	All research pertaining to

Health Determinant	Effects on Health	Affected Population	Evidence of health determinant's impact on health
Home energy efficiency	<ol style="list-style-type: none"> Improved comfort and quality of life Improved respiratory health Reduced deaths caused by air pollution 	All Kentuckians	<ol style="list-style-type: none"> Leech, Howden-Chapman, Fisk Howden-Chapman, Levy, Fisk, Leech Nishioka, Levy, California Air Commission
Energy efficiency building materials: PVC	Risk of cancer	Individuals utilizing PVC based materials	EPA
Reduced spending on housing costs	<ol style="list-style-type: none"> Improved nutrition Reduced Psychological Stress 	Low income families	<ol style="list-style-type: none"> Harkness, Schweitzer, Frank, Meyers Frank
Energy efficient lighting	1. Improved attention, learning, safety, and work efficiency	Children in schools and individuals in the work place	1. Veitch
Expansion of renewable energies industries	<ol style="list-style-type: none"> Reductions in injuries, disease, and fatalities associated with the extraction process of fossil fuels Healthier, diversified economy 	<ol style="list-style-type: none"> Energy industry workers All Kentuckians 	<ol style="list-style-type: none"> Sumner Tracz
Policy: Clean Air Act Amendments	1. Reductions of mortality, chronic bronchitis, nonfatal and fatal heart attacks, asthma	Adults with heart and lung diseases, elderly, children living with asthma, pregnant mothers, all	1. Chestnut L.G.



Next Steps:

HIA was used in outreach to the KY state energy secretary, natural resource and energy commissioners. Served as a foundation for dialogue.

HB 167 received a hearing but did not get a vote in committee. Bill is considered to be at the “educational stage.”

Effort to build momentum around inclusion of health concepts in policy development.



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