Access to energy for cooking, heating, transport, and productive activities is essential to human health. Access to electricity is also critical to improving health service delivery, strengthening health systems, and achieving universal health coverage. At the same time, the generation, distribution, and consumption of energy can have marked adverse impacts on health. In particular, the exploitation of fossil fuels for energy generation has serious implications for human health through its contribution to both local pollution and global climate change. These health impacts accrue into a heavy and largely unaccounted-for economic burden borne by communities, governments, and health systems.

Health impacts in the community

For all energy systems, the siting of facilities can directly and indirectly affect public health through air pollution, water pollution and consumption, and land use. The production lifecycle of fossil fuels in particular -- from extraction to waste disposal -- exacts a heavy toll on the health of communities both near and well beyond the immediate vicinity of the facilities. Fossil fuel combustion is a major contributor to outdoor air pollution, a leading global health risk.

Health impacts for workers

Energy systems are supported by millions of workers involved in construction, extraction, processing, transport, waste disposal, and end use. Many workers, particularly in low- and middle-income countries, are exposed to physically challenging work conditions that put them at risk of injuries, lung disease, cancer, poisoning, hearing loss, heat stroke, and radiation effects.

Health impacts through climate change

The burning of fossil fuels contributes a majority of the greenhouse gas emissions that drive global climate change. Climate change poses threats to human health through direct pathways such as heat stress, floods, drought, and intense storms, as well as indirectly through adverse impacts on air pollution, the spread of disease vectors, food insecurity and under-nutrition, displacement, and mental ill health. Because of its wide-ranging health implications, climate change is viewed as one of the greatest challenges to global public health, and tackling it could be the greatest global health opportunity in the 21st century.

Inequitable distribution of health impacts

Economically and socially marginalized populations bear a disproportionate health burden from fossil fuels due to higher exposures to pollution, greater vulnerability to factors such as malnutrition and poor access to health care, and lower resilience to climate change. Additionally, the energy production lifecycle can further undermine the social determinants of health for these already vulnerable populations, causing significant health harms through population displacement, social fragmentation, and livelihood disruption.
A Comparison of the Health Impacts of Energy Choices

PUBLIC HEALTH RISKS

**COAL**  Mining causes ecological damage, stresses nearby communities, increases risk of mudslides, and contaminates water. Transport causes air pollution, noise, and injuries. Combustion results in significant air pollution including particulate matter, ozone, and mercury. Coal waste contains toxic metals and radioactive materials.

**OIL**  Communities near refineries are exposed to a range of air toxics. Large-scale spills can cause injuries and fatalities, food contamination, and mental health disorders. Combustion yields a range of air pollutants as with coal. Waste may have health effects similar to those of coal waste.

**GAS**  Conventional gas: Air pollution from power plant operations. Unconventional gas: Hydraulic fracturing is highly water intensive and can contaminate water. Communities near production sites could also be exposed to air pollution, seismic activity, and radioactivity.

**NUCLEAR**  Each step in nuclear energy production leads to radioactive and chemical emissions and waste streams, which carry a low risk of water contamination and cancer in nearby communities. Accidents are rare but result in highly damaging radiation exposure.

**BIOFUELS**  Combustion creates less air pollution compared to fossil fuels. Diversion of farmland can threaten nutrition and food security. Depending on the feedstock, biofuel production may result in land use changes, high water consumption, water contamination, and ecological damage.

**HYDROELECTRIC**  Large hydro: Construction can displace vulnerable populations. Alteration of local hydrology may increase risk of infectious diseases. Dam failures can be catastrophic to downstream communities. Small hydro: Public health risks are not well-documented but assumed to be minimal.

**GEOTHERMAL**  Relatively low public health risks from air pollution, water contamination, waste streams. Some systems generate air pollutants and hazardous waste.

**SOLAR**  Public health risks are likely far lower than that of any fossil fuel, as there are no emissions during operation and no routine waste stream. Health concerns center around the management of toxic materials during manufacturing and end-of-life disposal.

**WIND**  Public health risks are likely far lower than that of any fossil fuel, as there are no emissions during operation and no routine waste stream. Health concerns center on noise from moving gear trains and turbine blades, which can disturb sleep or contribute to stress related disorders.

COLOR GUIDE
- most harmful to health; phase-out and strong protections advised
- less harmful to health; caution and protections advised
- minimally harmful to health, but protections for affected populations advised

OCCUPATIONAL HEALTH RISKS

<table>
<thead>
<tr>
<th>Energy Choice</th>
<th>Public Health Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACCIDENTS</strong></td>
<td>Silva and coal dust, carcinogens, heat, noise, and vibration.</td>
</tr>
<tr>
<td><strong>NUCLEAR</strong></td>
<td>Accidents, heat stress, leaks causing airborne carcinogens including ionizing radiation, and psychological stress.</td>
</tr>
<tr>
<td><strong>BIOFUELS</strong></td>
<td>Injuries, ultraviolet radiation, exposure to dust and other toxins, and other risks from commercial forestry.</td>
</tr>
<tr>
<td><strong>HYDROELECTRIC</strong></td>
<td>Toxic chemical exposures, diesel fumes, drowning, electrocution, noise, and other hazards involved in construction and operation, primarily for large dams.</td>
</tr>
<tr>
<td><strong>SOLAR</strong></td>
<td>Injuries, silicosis, noise, and toxic chemical exposures.</td>
</tr>
<tr>
<td><strong>WIND</strong></td>
<td>Hazards typical of manufacturing industries, including injuries, noise, and toxic chemical exposures.</td>
</tr>
</tbody>
</table>

CLIMATE RISKS

<table>
<thead>
<tr>
<th>Energy Choice</th>
<th>Environmental Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COAL</strong></td>
<td>44% of global CO₂, from fuel combustion, methane, and short-lived pollutants.</td>
</tr>
<tr>
<td><strong>OIL</strong></td>
<td>35% of global CO₂, from fuel combustion, methane, and short-lived pollutants.</td>
</tr>
<tr>
<td><strong>GAS</strong></td>
<td>20% of global CO₂, from fuel combustion, methane, and short-lived pollutants.</td>
</tr>
<tr>
<td><strong>NUCLEAR</strong></td>
<td>Minor climate impact from construction and mining-related land use changes.</td>
</tr>
<tr>
<td><strong>BIOFUELS</strong></td>
<td>Climate benefit from reduced combustion emissions may be negated by fossil fuel inputs, land use changes, and other factors.</td>
</tr>
<tr>
<td><strong>HYDROELECTRIC</strong></td>
<td>Variable climate impact from construction and operation, including significant emissions from reservoirs.</td>
</tr>
<tr>
<td><strong>SOLAR</strong></td>
<td>Minor climate impact from construction and operation. Open-loop systems are relatively small amounts of CO₂ and methane.</td>
</tr>
<tr>
<td><strong>WIND</strong></td>
<td>Minor climate impact from equipment manufacture.</td>
</tr>
</tbody>
</table>

Source: Health Care Without Harm 2016
Health costs and fossil fuel subsidies

Continued investment in, and subsidization of, coal and other fossil fuels for energy generation puts a tremendous strain on health systems and charges society with an “unpaid health bill.”4 Worldwide, post-tax consumer subsidies for fossil fuel companies (including the health costs of air pollution) have been estimated at US$5.3 trillion in 2015, or approximately 6.5% of global GDP. A group of leading economists has stated that the cost of implementing climate mitigation policies could be more than offset by the cost savings associated with the resulting health gains.8

Conclusions

• In order to meet energy needs while maximizing health, policymakers must carefully consider the health benefits and health risks of energy options.

• A future powered by healthy energy will require reducing dependence on dirty sources of energy, using energy more efficiently, and increasing investment in clean, renewable energy choices.

• Together, these strategies yield health and climate co-benefits: lower greenhouse gas emissions, reduced environmental disruption, and improvements to public health.

For More Information
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REFERENCES