Energy and the Public's Health: Making the Connection

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"Hell is where nothing connects."
—T.S. Elliott

Rarely does a scientific article come along that begs to be read by a much broader audience than the subscribers of a niche journal. Frumkin and colleagues have achieved such a feat in this issue of *Public Health Reports*. Their article, "Energy and Public Health: The Challenge of Peak Petroleum,"[1] should be required reading for every public policy leader, business executive, health-care provider, and general public health professional. It makes a connection between an old world where the use of carbon-based energy was largely related to wood burning and simple crop production, and a current world that is growing closer to exhausting the fossil fuel stores created by many millions of years of geologic processes. Frankly, it's quite hard to imagine that we have largely cannibalized the "easily obtained carbon-hydrogen bound energy" that is as much a part of our planet earth's history as is evolution. But the depletion is happening, just as Frumkin and colleagues have detailed.

And yet, petroleum is just one part of the nonrenewable energy resources that the global population is devouring with an ever-increasing appetite. Coal and natural gas are the other components of the historic photosynthesis-driven energy bank. Their use will impact both the rate of petroleum consumption over the next several decades and the speed at and extent to which the global climate-change-related greenhouse gases are increasing in our atmosphere. With the simultaneous occurrence of the exploding 21st-century human population and a rapidly growing part of the world evolving from low energy-consumption developing countries into high energy-consumption developed countries, carbon-based energy use will only accelerate over the next decade. Even under the best-case scenarios, clean renewable energy sources that can supply a substantial part of our energy budget are many years off. In the public health preparedness business, we often say, "Earthquakes, hurricanes, tsunamis, and influenza pandemics occur—we must be prepared." Well, peak petroleum will too occur, and no amount of wishful thinking will change the implications of what this phenomenon will mean to our world as we know it now. Most of us do not understand the depth and complicated intricacies of the connection between

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the role of our carbon-subsidized energy and our everyday lives. We only appreciate this energy source when we fill up our gas tanks or pay our heating bills. In fact, the carbon-subsidized energy of the modern world touches virtually everything we consume, drink, wear, use, or watch.

Frumkin and colleagues emphasize the impact that peak petroleum will have on public health and health care. While we congratulate them on a good start with painting that impact picture, we believe it is only a start. For example, it's traditionally stated that John Snow is the father of modern public health, as a result of his infamous work with cholera in the 1800s in London and because he served as a mentor to other public health-minded giants who followed. We would argue that while Snow, Edwin Chadwick, or even Lemuel Shattuck may legitimately hold claim to that title, Thomas Edison surely deserves serious consideration as well. Modern public health as we know it is largely based on the backbone of sanitation: safe water, comprehensive sewage systems, and safe food. The almost miraculous improvement in life expectancy in the 20th century—increasing from approximately 48 years to 76 years in the United States—was largely realized in the first 40 years of the century. This increase was directly related to our greatly improved sanitation conditions and the resultant drop in infant and childhood mortality associated with poor sanitation. How did we so dramatically improve sanitation? Simple—electricity.

With electricity, we built comprehensive water treatment and distribution systems, and safe and effective deep private wells driven by pumps. With water flowing readily into our homes and places of business and with the use of electric lift pumps, we built effective sewage treatment systems, eliminating the squalid conditions of our cities and towns. With electric-based refrigeration, our food supply took on a whole new safety margin, reducing illnesses related to poorly controlled temperatures for raw food products and eliminating the role that contaminated refrigeration ice played in spreading disease. Finally, vaccines could now be researched, developed, and produced in an electric world. Thank goodness for Thomas Edison.

Because almost 50% of our electricity in the U.S. is generated from coal-fired plants, all of the energy picture (not just peak petroleum) must be considered when we examine energy and the public's health. Of note, almost all of the coal currently used in electric generation plants around the country is mined with massive excavation equipment and is delivered by large coal trains—both of which rely on petroleum-derived diesel fuel. If these critical pieces of equipment and transportation systems can't operate because of a lack of petroleum-based products, even our nonpetroleum-supported energy system will begin to fail. In short, when we consider the impact of peak petroleum on our lives, we need to envision the many connections and ripple effects that this situation will have on all aspects of our "energy lives."

Frumkin and colleagues describe how we import a large quantity of our medical supplies, be they generic pharmaceuticals, gloves, gowns, or respirators. The impact of peak petroleum on the energy infrastructure in the countries that produce these products will be as significant as it is in the U.S. For instance, Japan, a major producer of pharmaceuticals and other medical products, imports via diesel-powered ships the majority of the fuel (natural gas) that it relies on for electrical generation. China, a major producer and exporter of medical products, has recently experienced serious shortages of diesel fuel due to a multitude of factors. These shortages have exacerbated existing problems with electricity outages in many of the manufacturing and exporting regions, where not enough diesel fuel is available for the standard practice of supporting backup generators.

These examples and most of the problems pointed out by Frumkin and colleagues are not within the control of the public health and medical professions. We can only keep a stock of supplies or fuel lasting so many days, and even this practice is typically not viable in today's marketplace. This situation does not mean that public health can ignore the inevitable crisis. Rather, we must be actively involved in finding solutions. The first step is to point clearly and loudly to all the obvious and not-so-obvious connections between all aspects of our current energy world and the public's health. Our group has been actively working over the past several years just to better understand and respond to the likelihood of an energy-challenged world during the next influenza pandemic. From this work, we can conclude two things: (*1*) the connections among the global just-in-time economy, energy availability, and public health are far more extensive than almost anyone can imagine, and (*2*) the public health community has been largely absent from this consideration and discussion of energy issues. That must change if we are to maintain the 20th-century public health improvements we now enjoy in the developed world and expand them to the rest of the world. The article by Frumkin and colleagues is a very good start.

REFERENCE

1. Frumkin H, Hess J, Vindigni S. Energy and public health: the challenge of peak petroleum. Public Health Rep 2009;124:5-19.