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The Sacred and the Propane

At first glance, much of the Torah seems irrelevant in today's culture. After all, say our secular and Christian scholars, the Torah is about an ancient agrarian society, with laws dealing with a pre-industrial culture, small farms, laws about sheep and goats as well as seemingly archaic themes such as slavery and sacrifices. It seems out of touch with today's modern world, a world of complex societies living in dazzling cities with fantastic structures wrought of steel, chrome, and glass. Our technologies are magical; we can travel to almost any part of the globe within a day, and we have been to the deepest parts of the ocean, and have walked on the moon. We can cure disease and transplant organs, and can communicate and send and receive any amount of information almost instantly. A person living three thousand years ago would surely be amazed at how we have evolved.

The Torah, however, is about to become relevant again (not that it was ever irrelevant; it was simply perceived so). The laws dealing with livestock, of plowing, reaping, and harvesting, with land boundaries, life revolving around the family and the community with small farms and craftsmen, all of these things that we look as quaint and outmoded in our modern lifestyle are about to re-introduce themselves and once again become relevant to us. Ironically, this is not the view of religious leaders, but the view based on the splendid empirical work of geophysicists such as M. King Hubbert.

Marion King Hubbert was a geophysicist working for the Shell oil company during the heyday of Big Oil. In June of 1956 Hubbert published a paper called "Nuclear Energy and the Fossil Fuels".

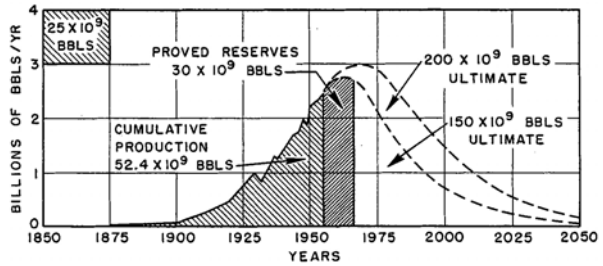
> "The fossil fuels, which include coal and lignite, oil shales, and tar and asphalt, as well as petroleum and natural gas, have all had their origin from plants and animals existing upon the earth during the last 500 million years … [w]hen we consider that it has taken 500 million years of geological history to accumulate the present supplies of fossil fuels, it should be clear that, although the same geological processes are still operative, the amount of new fossil fuels that is likely t o be produced during the next few thousands of years will be inconsequential."

Hubbert then based his observations on the depletion of oil fields in Ohio and Illinois, of how after a certain period from their discovery and initial drilling, the oil fields would

increase in production, level off, and then start to irrevocably decline. Hubbert demonstrated his theory of ultimate production-versus-time with a formula: [1]

$$Q_{max} = \int_0^\infty P dt$$

which led him to demonstrate the rise, peak, and decline of oil fields with a bell-shaped graph. The graph for oil production in the United States was this:



Ultimate United States crude-oil production based on assumed initial reserves of 150 and 200 billion barrels.

Hubbert did not say that the United States would run out of oil, but that once roughly half of the reserves (what was estimated to be in the ground) was taken out, then it would become harder and more expensive to remove the remaining oil, and that the decline of production would roughly mirror the production phase. Hubbert stated that

> "With due regard for these considerations, it is almost impossible to draw the production curve based upon an assumed ultimate production of 150 billion barrels … if we suppose the figure of 150 billion barrels to be 50 billion barrels too low … then the ultimate potential reserve would be 200 billion barrels … then the date of culmination is retarded only until about 1970."[2]

Hubbert was mocked and his theory criticized[3] by both oil experts and economists. During the first half of the twentieth century the United States was awash in oil; not only was the United States the world's largest oil producer, but the world's largest oil exporter, and the idea that production would go into irreversible decline in just 14 years seemed ridiculous. Hubbert, unfortunately, was correct, and United States production did in fact peak in 1970, just as Hubbert had predicted.

More disturbing was Hubbert's prediction for world-wide oil reserves. His graph for world-wide oil production:

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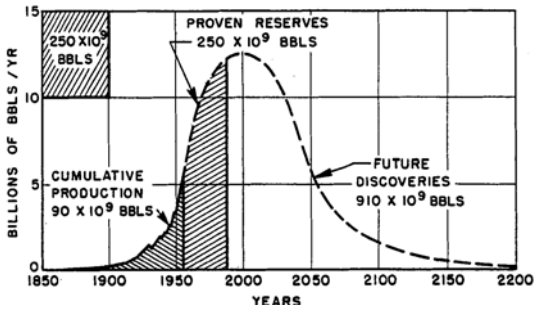
[1] Hubbert, p. 15.
[2] Hubbert, p. 23–24.
[3] The criticism of Hubbert's theory was similar to the criticism of Robert H. Goddard's 1919 paper *A Method of Reaching Extreme Altitudes* where Goddard first proposed that a rocket could go into outer space and return to earth.



Ultimate world crude-oil production based upon initial reserves of 1250 billion barrels.

As you can see in the graph, Hubbert predicted that world-wide oil production would peak sometime during the year 2000. The four largest oil fields in the world — Ghawar (Saudi Arabia), Cantarell (Mexico), Burgan (Kuwait), and Da Qing (China) — are all in decline, having peaked in the past few years. These four represent nearly 11% of all world oil production, which is (as of 2008) about 84 million barrels a day.

This might sound like unimportant trivia to some, but it has (and will continue to have) a significant impact on our economy and culture. As we follow the curve of Hubbert's bell graph, in twenty years — 2028 — we will only be able to produce as much oil as we did in 1988; in 2038 we will have as much oil as we did in 1978, and so on. The problem is that our population is much larger than it was in 1978, and is growing. The demand for oil is also greater than it was in 1978 due to the expanding economies of other large nations such as China and India.

As oil declines and demand grows, the competition for the remaining oil will undoubtedly be fierce. The greatest impact will be on the economies of the West. As oil becomes more and more expensive and scarce, and the cost of fuel skyrockets, trucks will stop delivering (as so many independent truckers go out of business), ships will stop delivering cheap electronics from the far East, air travel will slow to a trickle, and even that symbol of Americana, the private automobile, will be too pricey to run for all but the wealthy.

The problem with peak oil goes far beyond gasoline being more expensive and harder to come by. There are many products made from petroleum such as plastic. Think about all the things that are made from plastic: ball point pens, disposable diapers, bandages, umbrellas, synthetic cloth such as polyester, toys, car battery cases (and car interiors), fishing rods and lines, CVC pipes, trash bags, insulation for electric wiring, computer keys and casing — the list goes on and on. Practically all of our food comes in some sort of plastic, as do other goods such as shampoo, medicine, cleaners, etc. It is hard to imagine a world without plastic, and plastic is just one product we get from oil such as asphalt for our roads and insecticides.

The most devastating impact will be felt in agriculture. In 1859, when the first oil well was drilled in Pennsylvania, the world population was just over a billion people. This is close to the carrying capacity of the earth's ability to feed people without the aid of chemical fertilizers (such as ammonium nitrate) derived from natural gas, which is a by-product of oil. Right now, the population of the world is nearing seven *billion* people, a result of our being able to produce artificial fertilizers. We will soon lose the ability to feed billions of people around the world; already, food prices are causing riots in Asia,

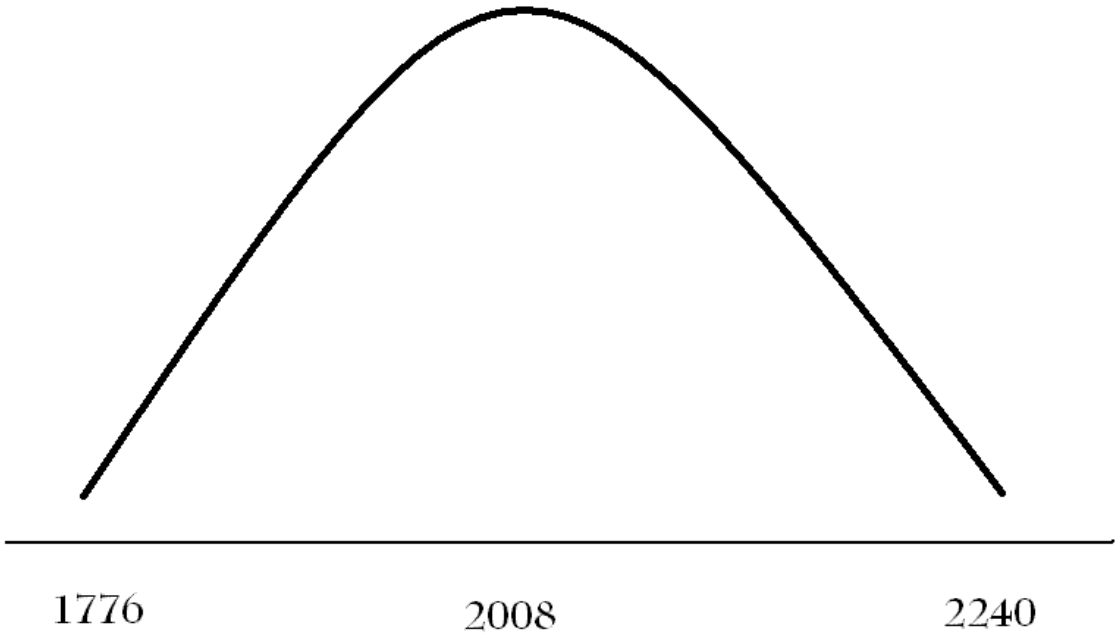
where the price of rice — the staple food of a good deal of the world's population — is skyrocketing.

You might think that there are alternative fuels we can use to replace oil. There are none. There is nothing that comes close to oil — one gallon of gas can push a two ton vehicle at sixty miles and hour for ten miles. How much energy would it take for you to push a car, even over level ground, for ten miles? Hydrogen is not the answer — there is more hydrogen in a gallon of gas than there is in a gallon of liquid hydrogen, and it takes more energy to produce than you can get out of it. This is what is known as the EREI — Energy Return on Energy Invested. This is the problem with many of the alternatives such as oil sands, oil shale, or ethonal; if it takes two gallons of oil to produce one gallon of alternative fuel (gas and diesel for mining, extraction, and transport) it is useless as a fuel source. We have hydro-electric plants, wind farms, and solar power, but you cannot fly planes or drive trucks with these energy sources. Besides, it takes massive amounts of oil to build dams, windmills, and silicon chips.

You can forget about globalization, too. Soon it will be too expensive to ship those cheap plastic toys and clothes from China and other places where they pay the workers fourty-five cents an hour. No more grapes and peaches from Chile in the middle of January. In fact, our whole economy is based on the availability on cheap non-renewable fuel such as gas and coal, and we are running out of both. Yes, there are many out there who say that there is plenty of oil out there, we just have to find it, or pump more of it. This is nonsense; geologists have combed the world over looking for the specific geological formations that contain oil, and this is why we are having to drill in places such as the Arctic and in the deep ocean — there simply are no more large oil fields. Certainly there are many small ones, but building a three-million dollar oil rig to produce two million dollars in oil is simply not cost-productive. And this is all that is left out there — smaller and smaller oil fields. There have not been any large discoveries in decades, and the oil companies are *closing* oil refineries, not building more. They know the end of oil is near.

This will also impact our ability to produce electricity. Dams, coal-mining equipment, power plants and power stations, the entire physical structure of our power grid with its miles of power cables, transformers, etc., takes lots of oil to build and maintain. Rolling brownouts will become more and more common, and one day the lights will go out and they won't come back on. No more refrigerators. No more air conditioning. No more internet or cell phones.

The implications for our society and our nation are mind-boggling. How can a complex and large nation-state like the Untied States survive? How will our government and military function? What will happen to our education system, our health care system? How will our cities, with their sprawling suburbs and people living miles away from their place of employment and grocery stores, survive? If we plot the history of the United States as a bell shaped graph (as with Hubbert's peak oil production) and have 2008 as the peak, starting 232 years ago with the year 1776 and adding 232 years, we come to the year 2240 as the end of our nation.



When one realizes what the year 2240 is on the Jewish calendar, this becomes more ominous.

What does this mean for the Noahide? Simply this: as the world-wide economy collapses and takes our modern oil-dependant culture down with it, we will be forced to return to our pre-fossil fueled society. We will have to adjust to local food production and local goods and services. We will have local government and smaller nations and states. The quaint life described in the Torah will once again be our way of life, and the Torah will be the template for the laws which we can live together in peace. So study your Torah well. It is about to become quite relevant, sooner than you think.