

Before and After Petroleum

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North Dakota produces more than one million barrels of oil a day that is sent to refineries to become products that simplify our everyday life. So simple in fact, that we may lose sight of all the advancements and pleasantries we have because of petroleum based products.

Many today are promoting the idea regarding our petroleum resources that we should simply “leave it in the ground.” For some of us who have never had to live without the benefits of modern petroleum products, it may be difficult to fully understand what life was like before petroleum and would be like without it.

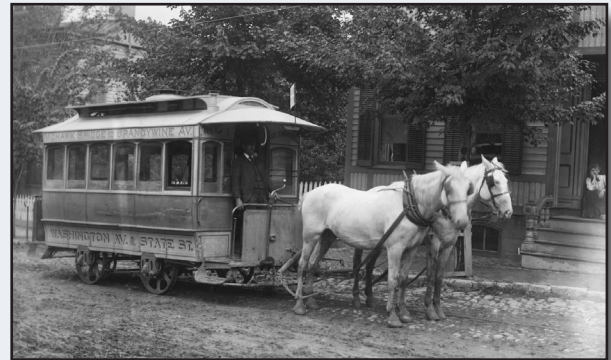
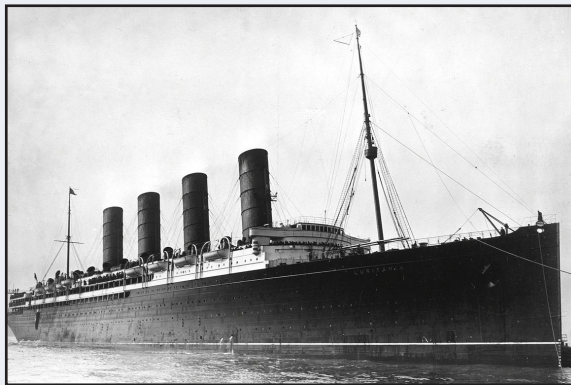


Image courtesy of the Schenectady County Historical Society



Let's start with the most obvious comparison of life before and after petroleum. How has fuel usage for travel improved our daily lives? In 1855, before petroleum, the best way to travel long distance from New York City to London was via steam ship. This trip took 6-7 days while traveling with 1,500-2,000 of your closest friends on a steam-powered ship and used 1.1 million pounds of coal to generate the steam to power the ship. Today, the only way you would even think of traveling to London is on an airplane. On a 747 you can travel with a mere 365 of your closest friends, for seven hours. This method of travel uses just 185,000 pounds of jet fuel.

For day to day travel in the 1900s, the horse and buggy or horse-drawn trolley were the preferred methods. To service the 1900s' population of New York City it took 120,000 horses, which generated two to four million pounds of manure and 277 million pounds of CO₂ and CH₄ per day. Sanitary conditions aside, the use of petroleum products in motorized vehicles replaces the 300,000 horses that would be needed for today's New York City population, producing 214.5 million less pounds of CO₂ and eliminating seven million pounds of infectious disease producing manure. Replacing horses with cars has made our daily commute more efficient and improved our health.



Speaking of health, modern medicine has benefited from petroleum production. Yes, medicine is a petroleum-based product, with nearly 99% of all modern medicines using petroleum as their starting material. This has made medicine more widely available and affordable. Aspirin once cost \$1.64 each, but now that it is made from petroleum, one Aspirin costs around \$0.06. Advancements in medical technology and sterilization, thanks to petroleum, have also benefited our health by greatly reducing mortality rates during surgery. Before petroleum products improved surgery techniques and equipment, the mortality

rate from complications during surgery was nearly 50%. Now that petroleum-based products have improved practices during surgery, mortality from complications has dropped to .009%.

Lower mortality rates lead to higher world populations. Our current world population is about 7.5 billion with an estimated world population of 11 billion by 2100. Petroleum products help feed the growing world by allowing more bushels per acre to be harvested and taking less man hours to do so. Agriculture yields and transportation systems used before petroleum could feed only 2-3 billion people. This means if petroleum resources were "left in the ground" 4.5-5.5 billion people would perish.



Believe it or not, renewable energy, or more appropriately, interruptible energy like wind and solar, also require the use of petroleum at some point. While all forms of energy are important, renewables aren't 100% renewable. Early wind turbines required the use of batteries. Each cell was covered with a layer of "mineral seal" oil to prevent evaporation, spraying and to suppress odors. Today 2,000-3,000 gallons of diesel fuel is required to power the machines that transport and assemble the 900 tons of material for each wind turbine. Also, wind's capacity factor of 0.31 means that 300,000 cubic feet per day of natural gas needs to be available for back up generation for each wind turbine, due to variability of the wind. Early solar panels used ammonia or steam from water to power pumps. Today, solar panels can produce direct current electricity that can be inverted to enter the power grid. However, solar energy has a capacity factor of less than one due to clouds and darkness. The capacity factor of solar energy in California means that 2.6 billion cubic feet per day of natural gas is needed for back up generation to meet night time electricity demand.



Petroleum can't be left in the ground. Every day the oil and natural gas industries refine technologies to make extraction more efficient and more compatible with the environment, so you can enjoy modern essentials that you probably didn't even realize were made possible by petroleum products.



Petroleum products have improved many other aspects of our daily lives. Without petroleum, doing the laundry for a family of four would take 2-4 days per week using soap from lye and animal fat; water heated on a coal or wood stove and clothes hung on a line to dry. With petroleum, laundry for a family of four takes one day per week using petroleum-based detergents, fabric softeners, stain removers, and wrinkle-free fabrics, with water heated and clothes dried by natural gas.

Even modern communication has improved thanks to petroleum. Before petroleum, long distance communication was by telegraph, with a maximum distance of 100-300 miles, maximum rate of 30-45 words per minute and a cost of \$0.15 per word. Now, long distance communication is by cell phone with 15-20% of your phone made of plastic. The maximum distance is unlimited; maximum rate limited only by how fast you can talk or text; and the cost is \$20-\$50 per month for unlimited calls and data.

