

# Advanced Plastics in Modern Medicine: Only Possible with Hydraulic Fracturing *Improving Lives, Saving Lives*



Americans often take for granted the thousands of products made from oil and natural gas that they use every day, from lightweight automobile parts and paint to food packaging and performance clothing. These important consumer items can only be made by processing crude oil and natural gas, using chemical treatments and technologies to make each product. The same goes for the hundreds of petroleum-derived items used by health care providers, from simple items such as band-aids and latex gloves, to complex heart valves and artificial joints. More than 90 items made possible through the processing of oil and natural gas into advanced plastics and synthetic rubber are shown in this photo of a typical emergency room.

## Items in a typical emergency room

Blood pressure cuff	IV Pole wheels and hook	Overhead lamp/bulbs	Suction canister
Blood pressure cuff tubing	IV pump	Oxygen saturation finger probe	Suction tubing
Chair	IV pump power cord	Oxygen wall to tubing adapter	Thermometer
Code cart/wheels	Laminated charts	Patient education packets	Thermometer probe covers
EKG Leads	Monitor/cables	Plastic patient belonging bag	Trash bag
EKG wire covers	Nasal canula	Plastic slip cover for mattress	Trash can
End-Tidal carbon dioxide cable	Ophthalmoscope	Plastic-lined pillows	Wall oxygen dial
Fluorescent light covers	Otoscope	Stethoscope label	Wall suction dial
Infectious waste container	Otoscope covers	Stethoscope tubing	Yankauer suction

## Items found in an ER code cart

AED	Intubation blade	Needle caps	Plastic tape
Alcohol swab packaging	IV catheters	Non-rebreather mask	Portable suction pump
Ambu bag	IV fluid bags	Oral airways	Saline flushes
Atomizer	IV tubing	Oxygen tank dial	Sharps container
Code cart lock tab	Lubrication	Pacer pads	Syringe caps
CPR back board	Medication ampules	Plastic cart housing	Tourniquets
Endotracheal tubes	Medication bottles	Plastic cover over tip of scissors	Venti-mask
Exam gloves	Nasopharyngeal airways	Plastic syringes	

## Other medical devices used on a daily basis

Adhesive foam	Jackson Pratt drain	Peripheral venous catheter	Sterile gowns
Bedpan	Medical glue	Plastic boxes of gauze	Sterile packaging
Bleach wipe containers	Nasogastric tubes	Plastic medicine cups	Sutures
Crutch pads/grips	Ostomy bags and appliance	Plastic packaging on medications	Three-way stopcocks
Date stickers	Patient call bell	Pyxis machine	Urinary catheters
Hemovac drain	Patient room phone	Skin barrier packaging	Walkers/canes
IV caps	Patient socks/grip bottoms		



**JUST  
THE  
FACTS**



## **No Substitute for Products Made from Natural Gas & Oil: Saving Lives & Enhancing Safety During COVID**

Pennsylvania's medical and public health landscape changed dramatically on March 16, 2020, when Gov. Tom Wolf ordered "non-essential" businesses in the Commonwealth to close due to increasing COVID-19 cases. A combination of uncertainty, anger, fear and eventual clarity followed as more was learned about the disease and how people could protect themselves against it.

Thousands of essential workers were vital to the effort to fight the pandemic: medical professionals who staffed doctors' offices and hospitals, store employees who supplied us with food and other essential items, trucking and delivery personnel who transported items to stores and to our homes, just to name a few.

Two additional essential items helped Pennsylvania and the rest of the nation reach a turning point - where we are returning to a degree of normalcy - and deserve to be highlighted: the natural gas and oil that are essential to the manufacture of the medical, safety and consumer products Americans use every day.

### **Here are the facts:**

#### **Recreational and Consumer Goods**

Many Americans changed their recreational habits during COVID and opted for socially distanced adventures, resulting in a huge demand for camping gear, sporting goods and related outdoor equipment. People were also diligent about keeping everything clean, using detergent, soap, hand sanitizers, plastic food packaging and other cleaning products. The thousands of items flying off the shelves for these outdoor and indoor needs have either natural gas or oil as a primary feedstock - and there are no substitutes.

#### **Personal Protective Equipment**

The initial demand for N95 masks in the U.S. resulted in panic buying by individuals and essential medical providers, to the point that they were often not available to the average consumer. Other types of PPE, from plastic face shields to disposable medical treatment clothing, were also scarce. The fact is that all of these items are also made from natural gas and

oil, along with the plastic shields installed at stores and restaurants around the country, latex gloves used by many essential retail and medical personnel, and mass-produced masks that were eventually in sufficient supply that they were given away at entrances to many stores. There is no substituting for the role natural gas and oil plays in making virtually every type of PPE.

#### **Emergency and Urgent Care Medical Needs**

With some hospitals forced over the past year to convert parking garages into temporary care units, portions of our country's medical infrastructure faced a crisis at one time or another. People with the most serious cases of COVID required intubation with a ventilator, intravenous medicine drips and scores of specialized medical devices (see a full list of medical device shortages from the FDA here: [COVID Medical Device Shortages](#)), with most of them made possible by processing natural gas and oil.

## Pharmaceuticals

A final and important natural gas and oil-based weapon in the fight against COVID focuses on pharmaceuticals: their manufacture and delivery. It is a fact that most pharmaceuticals are made through chemical reactions involving organic molecules, and petroleum is a plentiful source of those molecules. Pfizer's vaccine must be stored at ultra-cold temperatures that require carbonic ice derived from petroleum. Transportation fuel is used to fly and truck vaccines quickly across the country, and each dose is administered with a plastic syringe made possible by natural gas processing.

**“Approximately 3% of petroleum production is used for pharmaceutical manufacture, but nearly 99% of pharmaceutical feedstocks and reagents are derived from petrochemicals.”**

Source: Petroleum and Health Care: Evaluating and Managing Health Care's Vulnerability to Petroleum Supply Shifts" National Institutes of Health, National Library of Medicine, 2011



PIOGA published this printable, [downloadable infographic](#) in February 2020, highlighting the nearly 100 items made from natural gas and oil found in every emergency room. From stitching up a cut finger to receiving an IV bag saline drip, these products will play a critical role in medical care for the foreseeable future – and there are no substitutes.

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Patient call bell	Urinary catheters
Patient room phone	Walkers/canes

## The Facts

Technologies used to produce thousands of vital products made the fight against COVID winnable. Many Americans take these products for granted, but the fact remains that there is no substitute for the natural gas and oil needed to make them. Oil and natural gas is – and will continue to be – one of our most essential industries.



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## JUST THE FACTS



# Fossil Fuels Essential to Four Essential Materials that Support Civilization

*Time Magazine* published an analysis recently by Vaclav Smil, a scientist, policy analyst and Distinguished Professor Emeritus at the University of Manitoba, that demands amplification by Pennsylvania's oil and gas industry and other people interested in facts about the importance of fossil fuels in a modern society. Smil identifies four materials as the pillars of our current civilization - cement, steel, plastics and ammonia - and notes that they are needed in larger quantities than are other essential inputs, and will remain in high demand in the future.

Here are the facts about the importance and value of each of those manufactured items and the reality: there is no substitute for the fossil fuels needed to produce them.

### Steel, Cement, Plastic, Ammonia

The world currently produces 4.5 billion tons of cement, 1.8 billion tons of steel, nearly 400 million tons of plastics, and 180 million tons of ammonia every year.

Let's start in reverse order with ammonia, because it is probably the most important one, as it allows us to efficiently meet the basic human need of nutrition. Ammonia is synthesized into all nitrogen fertilizers, and its current production levels are essential to grow the food that meets the needs of about half of the world's population of 8 billion people. Ammonia's importance to feeding people in China is even greater, with three out of five people in that country depending on the synthesis of this compound for fertilizers - with no current substitutes to meet future needs.

The oil and natural gas industry has been pointing to the essential role plastics play in every aspect of our lives for many years, and their uses in important health care, safety and manufacturing applications are only growing. As Smil points out in his essay, life now begins (in maternity wards) and often ends (in intensive care units) surrounded by plastics.



In February 2020, PIOGA published this photo, along with a list of almost 100 devices and equipment derived from oil and natural gas that are found in a typical emergency room. Two months later, emergency departments in hospitals in many parts of the country were relying on this type of equipment - and far more petroleum-based materials - to treat COVID patients.

This and other helpful fact sheets can be found at [pioga.org/education/pa-oil-and-gas/fact-sheets-and-additional-resources](https://pioga.org/education/pa-oil-and-gas/fact-sheets-and-additional-resources).

The third product, steel, is our civilization's most widely used metal, and is valued for its strength, durability and versatility. Steel is also used in the tools and machines that extract, process, shape, finish and distribute just about all other metallic and non-metallic products we use.

We would not have mass transportation vehicles or systems without steel, and steel makes up about 1,900 pounds of the average car.

Without cement, our society would have no concrete, which is the world's largest-deployed material and essential to most construction projects. Its use is increasing, not the opposite, with the world now consuming more cement in a single year than it did during the entire first half of the 20th century.

### **No Substitutes, Any Time Soon**

A theme that equals the huge global demand for these four materials is the fact that they cannot be replaced any time in the near future, particularly on a world-wide scale. Any objective analysis also points to the undeniable fact that we will need more of them in the future, and their production on a large scale requires the use of fossil fuels. To quote Smil's *Time Magazine* analysis: "organic fertilizers cannot replace synthetic ammonia: their low nitrogen content and worldwide mass are not enough even if all manures and crop residues were recycled. No other materials offer such advantages for many lightweight yet durable uses as plastics. No other metal is as affordably strong as steel. No other mass-produced material is as suitable for building strong infrastructure as concrete, which is often reinforced with steel."

Smil also notes that even if some countries were able to reduce demand for these materials, a continent like Africa, with the world's fastest-growing population, will need to do the opposite with ammonia to increase its food supply and reduce imports. The demand for steel and cement – to fix outdated infrastructure in affluent countries and build new infrastructure in low-income and developing countries – will also remain strong. Plastics technology, to advance lighter, stronger and more durable products, will also drive demand.

These materials are also essential to the manufacture of renewable energy systems, whether to build and supporting steel towers for wind turbines or mine the rare earths needed to construct solar panels, to name just a few steps involved in the process of sourcing, producing, transporting and installing those energy sources.



Wind turbines provide an iconic representation of renewable energy, but bringing one online is a fossil-fuel intensive process. Foundations are made of reinforced concrete, and towers, rotors and other supporting equipment are made of steel. Massive blades are made of energy-intensive plastic resins, and specialty oils are needed to keep gearboxes running. Every part of a wind turbine has to be transported by large trucks or even ships, and then assembled at the location using large steel cranes.

## **The Facts**

Vaclav Smil deserves the credit for pointing out the hard, cold fact that fossil fuels remain indispensable to manufacturing these four materials, now and in the future. It is also a fact that oil, natural gas and coal from Pennsylvania will continue to support their production.



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