

FROM CLEOPATRA



TO COLUMBIA

Randy Udall

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It is now apparent that the space shuttle Columbia was in trouble long before it broke up over Texas last February. Within hours of the tragedy, disturbing photos taken by California astronomers were posted to the Internet. In these images, the streaking shuttle shone like a torch. Off to the side were smaller bright spots, fluttering down and away. These, NASA believes, were omens of disaster, heat shield tiles shedding from the left wing. As superheated plasma fed into the breach, it melted the wing's aluminum skeleton, dooming the reentry. When the first tiles came off, the astronauts were traveling 15,000 miles an hour. Six minutes later, and 1,500 miles to the east, their ship disintegrated over Texas.

From time to time, I lecture about energy issues, and before this accident, I had often compared our industrial civilization to a space shuttle, the world's most sophisticated flying machine. The shuttle, like the civilization, has an enormous energy appetite. During launch, each of its six fuel pumps consumes as much energy as a city of 50,000. At full thrust, its main engines could power California.

As a child of the space age, I remember watching John Glenn's first orbital mission in 1962. It was a quick trip—three laps at 17,544 miles an hour. In a few hours aloft, Glenn clocked 80,000 miles. The original astronauts were revered as a special breed. Lately, though, I've begun to wonder if all of us aren't, in some curious way, as energy-rich and speed-drunk as any NASA pilot. John Glenn and John Doe have more in common than they suspect.

Hypermobility

A typical baby boomer, for example, will drive and fly more than a million miles during his or her lifetime, equal to forty trips around the planet. Magellan and Amelia Earhart were the famous circumnavigators of their day. But now every man is Magellan, every woman Amelia. Even if you never fly, it's still possible to log a million miles. Many commuters drive 20,000 miles per year, the distance to the Moon every twelve years. I own a rusty Volvo with 250,000 miles on it. It's been to the Moon, and is on its way back.

Our fantastic hypermobility is taken for granted. This afternoon you could drive to the nearest airport, book a flight for Paris, and fly the Atlantic just like Lindbergh did in 1927. He was greeted by thousands of awestruck Frenchmen, and like Glenn, would be a hero for life. You? You can gripe about the airline food or carp about security.

So, how did we get here—to this place where 50 mph seems slow, where jet lag is an occupational hazard, where speed rules? If as someone once wrote, "Your soul can only travel at the speed of a camel," there must be millions of plodding souls out there, searching the barren wastes, wondering where in the blazes their owners went.

Muscle Power

Our world is so dominated by machines and motors (50 in a typical home) that it's easy to forget that most of human history has been powered by muscle. In his book, *Prime Mover: The Natural History of Muscle*, Steven Vogel describes how muscle makes up 40 percent of our weight, that nature

perfected muscle a billion years ago, that muscle powers ant and elephant alike, that “flies fly with it, clams clam up with it.” To watch bicyclist Lance Armstrong hammer up the French Alps is to see muscle returned to its former glory.

As every backpacker quickly learns, a muscle-powered world has a different rhythm, a slower tempo. Writing about the Lewis and Clark expedition, author Stephen Ambrose explained, “In 1800, nothing moved faster than the speed of a horse. No human being, no manufactured item, no bushel of wheat, side of beef, no letter, no information, no idea, order, or instruction moved faster. Nothing ever had moved any faster and, most people thought, nothing ever would.”

By canoe and horseback, it took Lewis and Clark two-and-a-half years to travel from St. Louis to the Pacific Ocean and back. Paddling downstream on the swollen Missouri, they may have broached 8 miles an hour, but that was their speed limit. To go faster than this, you need a machine of some sort. On flat ground, Armstrong can pedal his bike about 30 miles an hour, generating about one-half horsepower for short periods.

If men or women work in unison, it’s possible to develop more power, and Cleopatra offers a nice example. Her idea of a good time was to have 60 slaves row her along the Nile. Tugging on the oars, with some encouragement from the lash, this crew could produce about eight or ten horsepower. Put differently, the queen of Egypt, the world’s richest woman, had about 200 times less power at her disposal than a typical soccer mom in an SUV.

Energy Rich

Unlike muscle, aka meat, the ancient edible engine, machinery is quite new. Go outside and pop the hood of your car. There in your driveway sits an engine more powerful than anything on the planet two hundred years ago. Your neighbor has one, too. From an energy perspective, both of you are astoundingly rich.

Cars have not been good for civic life, climate protection, or land use planning. But the engines manufactured by car companies each year are more powerful than all the world’s electric power plants combined. American automobiles consume about four times more energy each day, in the form of gasoline and diesel, than we humans do in the form of food. They, not we, are the planet’s dominant life form.

Photovoltaic panels and wind turbines and sailboats run on flows of energy. But machines must be stoked with fuels. Wood, of course, is the original. Towards the end of their empire, the Romans had built an entire fleet of ships to import wood from France and North Africa.

Whenever wood ran short, and wherever geology permitted, people burned coal. In her book *Coal: A Human*

History, Barbara Freese describes how some Chinese miners used to work what they called the “big shift,” living in the mine for a month at a time, digging, eating, sleeping, smoking opium, and even doing laundry underground.

Coal has long kept people warm, and still does in many places, but it took a genius to turn coal into motion and thus spark the Industrial Revolution. His name is found on every light bulb and solar panel—James Watt, the famed Scottish inventor of the steam engine. From coal came steam and iron, and the three quickly learned how to feed on each other.

The poet Emerson was among the first to grasp the implications. “Coal is a portable climate,” he wrote. “Watt whispered in the ear of mankind his secret, that a half-ounce of coal will draw two tons a mile, and coal carries coal, by rail and by boat, to make Canada as warm as Calcutta, and with its comfort brings industrial power.” Today, coal seems like a retro fuel, but more than half of U.S. electricity comes from burning it, and the Chinese have more coal miners than soldiers.

If coal and steam feed on each other, so too do energy and ingenuity. In 1903, the Wright Brothers, bachelor bicycle mechanics, deciphered the rules of flight and built the pieces of the world’s first airplane, lashing them together with muslin cord. Wilbur Wright, in particular, was brilliant, a total genius. Their plane was powered with gasoline donated by John D. Rockefeller and a four-cylinder, 12-horsepower engine that the Wrights built above their bike shop. When Wilbur flew around the Statute of Liberty in 1905, he lashed a canoe below the wing in case of a water landing. Sixty-six years later, Americans were driving on the moon.

The essayist Loren Eiseley wrote, “Man’s long adventure with knowledge has been a climb up the heat ladder... The creature that crept furred through the blue glacial nights now lives surrounded by the hiss of steam, the roar of engines, and the bubbling of vats. And he is himself a great flame, a great roaring wasteful furnace, devouring irreplaceable substances of the earth.”

Oil Tribe

Those of us alive today tend to believe that we are living in a normal time, that malls and expressways are the nature of things. From an energy perspective, however, this is lunacy. In recent times, we have read about the Pashtuns, Uzbeks, and Tajiks in central Asia, strange tribes with curious customs. But contemporary Americans are arguably the world’s most exotic people, members of the Oil Tribe.

Daily energy flows in the U.S. are now a million British thermal units per person. This is the energy equivalent of eight gallons of gasoline or 100 pounds of coal. One million BTUs is also roughly equivalent to how much energy it

**THE QUEEN
OF EGYPT,
THE WORLD’S
RICHEST WOMAN,
HAD ABOUT
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AT HER DISPOSAL
THAN A TYPICAL
SOCCER MOM
IN AN SUV.**

would take to ride a bike 25,000 miles. Or the amount of energy contained in a bolt of lightning. This is America—explosive, lit up, mobile, jacked to the nines.

The defining ritual of our culture is not Monday Night Football or church on Sunday; it is pulling into a gas station to fill 'er up. Per person, we Americans now consume 140 pounds of petroleum products each week—nearly our body weight every seven days. Petroleum is more addictive than cocaine, and for a culture like ours, all roads eventually lead to Baghdad, to the Persian Gulf, to five Muslim nations that own half the world's remaining oil.

We Americans are as dependent on oil as the Sioux were on bison. But whereas they celebrated the beast in dance, story, and ritual, we pull into the 7-Eleven, buy 20 gallons and whine about the cost. We ought to have a holiday dedicated to petroleum, or at least bow to Mecca when we buy it. And the fact that we don't says something troubling about us.

I'm left with two questions. If our oil-driven civilization can be compared to a space shuttle, have the first tiles already come off? How stable is our Starship Enterprise?

And it's not just the 150,000 soldiers we've sent to Iraq, and the other soldiers fighting proxy oil wars on our behalf in Colombia, Kuwait, Qatar, Kazakhstan, and Indonesia that concern me. Last summer, we also had the spectacle of Federal Reserve chairman Alan Greenspan testifying to Congress about the nation's natural gas crisis. Due to rapid depletion rates at existing wells, Greenspan noted, "More than half of the nation's current gas production must be replaced in the next three years." Two-thirds of the nation's oil has already been burned, automobile fleet mileage is at its lowest level in twenty years, the 1990s were the warmest decade in a thousand years, purchasers of Hummers qualify for a \$100,000 tax deduction, and since 1990 we have added one California's-worth of people and automobiles.

Who's Driving?

And so, as we fasten our seatbelts in the event of unexpected turbulence, it behooves us to ask my second question—is anyone in the cockpit, is someone actually flying this thing, or are we on autopilot?

I've visited drilling rigs and power plant control rooms, so I know that engineers are monitoring the electricity grid, gathering the natural gas, and making sure that the Alaska oil pipeline doesn't freeze and turn into the world's largest Chapstick, in Amory Lovins' memorable phrase. But the more I read, the more convinced I am that the flight deck itself is empty. Maybe the pilot had an infarct, or maybe there never was a pilot, but U.S. energy policy is brain dead, and prospects for a soft landing don't appear good.

Join the Sun Clan

So maybe it's a good time to learn about energy, learn about home power, learn about how we might capture some of that sunlight hitting the roof, which has traveled 93 million miles in eight minutes, photons hauling ass. If we've climbed up Eiseley's heat ladder, our children and grandchildren may have to climb back down. So maybe we

ought to spend less money driving to the Moon, and a bit more on compact fluorescent lights, which can reduce our greenhouse gas debts, and on photovoltaic panels, which outliving us, are a gift we can give our descendants, Godspeed on their journey.

You and I are traveling awfully fast, but no one ever said that members of the Oil Tribe couldn't join the Sun Clan, celebrate the Solstice, and rearrange our priorities. It's an unusual moment in human history. Maybe speed and power aren't everything they've been cracked up to be. If we slowed down a bit, let the engine cool, maybe our souls could finally catch up.

Access

Randy Udall, Community Office for Resource Efficiency (CORE), PO Box 9707, Aspen, CO 81612 • 970-544-9808 • Fax: 970-963-5691 • rudall@aol.com • www.aspencore.org

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