Discourse analysis

Fuel Forever

Isaac Asimov

Ever since human beings discovered how to tame fire many thousands of years ago, we have been burning things for energy—wood, fat, wax, coal, oil, even animal wastes—and now we’re running low. Soon it could be quite a scramble to find enough material to burn for our energy needs.

However, we could look to energy without fuel—from wind and water and sun, which don't pollute and don't run out.

But even so, how does that help transportation, for instance? You can't drive an automobile by putting a sail on its roof or by focusing sunlight on its rear or by setting up a small waterfall under its hood.

Certainly not. But the nonfuel sources of energy can be used to generate electricity; electricity can charge storage batteries; the storage batteries can run electric cars.

Electric cars are relatively noiseless and nonpolluting, but they tend to be slower than gasoline-powered cars. Besides, a fully charged battery won't take you as far as a full gas tank, and it takes considerably longer to charge a battery than to fill a tank.

But then, what's our hurry? It might be better if we don't travel as far or as fast.

Of course, we can't electrify everything. It is difficult to imagine electric ships and just about impossible to imagine electric airplanes and rockets. It would be nice to have some fuel in the future for those purposes where fuel is particularly convenient or even indispensable.

As it happens, there is a fuel that will never run out: hydrogen. A given weight of hydrogen will yield three times as much energy as the same weight of gasoline and four times as much energy as the same weight of coal.

There's an easy source of hydrogen, too. Once we have a plentiful source of electricity from wind, water, and sun (and also, perhaps, from nuclear fusion), that electricity can be used to break the water molecule into the two elements that make it up—hydrogen and oxygen. The technique has been known since 1800. We have, of course, 300 million cubic miles of water in the ocean to serve as raw material.

We can allow the oxygen to escape into the air, while hydrogen gas is piped to wherever it is needed through the network we have developed to handle natural gas.

When hydrogen is burned to produce energy, it turns back into water and nothing else.
What's more, the oxygen it consumes in its burning is exactly equal in volume to the oxygen released into the air when the water molecule was broken up.

Hydrogen gas is very light and takes up much room. Moreover, it is difficult to compress and very difficult to liquefy. How could it be handled on a small scale?

It was recently discovered that an iron-titanium alloy can absorb hydrogen in great quantities when cold; then, when heated moderately, the hydrogen is released again. We can imagine a type of gas tank filled with a spongy alloy into which hydrogen can be led, under pressure, and which will feed it into an engine in small quantities.

There is a serious catch, though. Hydrogen burns too easily. It is, in fact, explosive, and the smallest spark will set it off. (Remember the Hindenburg!)

There is, however, another way of storing hydrogen. It can be combined with carbon dioxide (an easily obtained substance) to produce such things as methyl alcohol and methane. These are fuels that deliver less energy, weight for weight, than hydrogen does, but are also less explosive.

For that matter, given a convenient source of plentiful energy, we can begin with hydrogen and carbon dioxide and, after a number of chemical manipulations, end up with gasoline, the molecules of which are made up of chains of seven or eight carbon atoms with hydrogen atoms attached. Oxygen is again left over and discharged into the air.

We'll have gasoline after all, then, and forever. What's more, it will be nonpolluting. There will be nothing in it but carbon and hydrogen so that when it burns, we get back the carbon dioxide and water we started with and nothing else. Nothing gets used up except energy from wind, water, sun, and possibly nuclear fission, all of which will last as long as the earth will.
Part I:

In your hands, my fellow citizens, more than mine, will rest the final success or failure of our course. Since this country was founded, each generation of Americans has been summoned to give testimony to its national loyalty. The graves of young Americans who answered the call to service surround the globe. Now the trumpet sounds again—not as a call to bear arms, though arms we need—not as a call to battle, though embattled we are—but as a call to bear the burden of a long twilight struggle, year in and year out, "rejoicing in hope, patient in tribulation"—a struggle against the common enemies of man: tyranny, poverty, disease and war itself.

Can we forge against these enemies a grand and global alliance, North and South, East and West, that can assure a more fruitful life for all mankind? Will you join in that historic effort?

In the long history of the world, only a few generations have been granted the role of defending freedom in its hour of maximum danger. I do not shrink from this responsibility—I welcome it. I do not believe that any of us would exchange places with any other people or any other generation. The energy, the faith, the devotion which we bring to this endeavor will light our country and all who serve it—and the glow from that fire can truly light the world.

And so, my fellow Americans: ask not what your country can do for you—ask what you can do for your country.

My fellow citizens of the world: ask not what America will do for you, but what we together can do for the freedom of man.

Finally, whether you are citizens of America or citizens of the world, ask of us here the same high standards of strength and sacrifice which we ask of you. With a good conscience our only sure reward, with history the final judge of our deeds, let us go forth to lead the land we love, but knowing that here on earth God's work must truly be our own.

excerpt from the end of
Kennedy’s 1961 Inaugural Address

EXERCISE: TEXT ANALYSIS.

Examine the following text for parallelism, for audience inclusion, and for word choice.

Part II:

...Let the word go forth from this time and place, to friend and foe alike, that the torch has been passed to a new generation of Americans—born in this century, tempered by war, disciplined by a hard and bitter peace, proud of our ancient heritage—and unwilling to witness or permit the slow undoing of those human rights to which this nation has always been committed, and to which we are committed today at home and around the world.
Let every nation know, whether it wishes us well or ill, that we shall pay any price, bear any burden, meet any hardship, support any friend, oppose any foe to assure the survival and the success of liberty... So let us begin anew—remembering on both sides that civility is not a sign of weakness, and sincerity is always subject to proof. Let us never negotiate out of fear. But let us never fear to negotiate.

Let both sides explore what problems unite us instead of belaboring those problems which divide us.

Let both sides, for the first time, formulate serious and precise proposals for the inspection and control of arms—and bring the absolute power to destroy other nations under the absolute control of all nations.

Let both sides seek to invoke the wonders of science instead of its terrors. Together let us explore the stars, conquer the deserts, eradicate disease, tap the ocean depths and encourage arts and commerce.

Let both sides unite to heed in all corners of the earth the command of Isaiah—to "undo the heavy burdens...[and] let the oppressed go free."

excerpt from the middle of Kennedy's 1961 Inaugural Address