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First, the briefest words about United Technologies Corporation. We'll be about $60 billion in revenues this year and build aircraft engines (Pratt & Whitney), helicopters (Sikorsky), elevators (Otis), heating and air conditioning systems (Carrier), fire protection and security systems, aircraft and space systems, and even our country's iconic space suits. Finally, we build hydrogen powered fuel cells and a line of on-site co-gen products of particular interest today.

The common denominator of every single thing we do is to convert energy to useful work, whether elevators or air conditioning or aerospace. So we're highly alert to the energy and conservation agenda.

I have a single point to emphasize in these remarks: we can do more with less, and indeed much more with much less. Let's start with the fact that 91 percent of the energy coming out of the ground is lost or wasted before it becomes useful work. It does not have to be that way, not remotely. A glaring example is that half of the input energy in a central station power plant goes up the stack as waste heat because we can't move heat effectively any distance at all. But how about putting the generation on-site and capturing and using the waste heat there. We do this routinely, and the answer is that energy conversion efficiencies (which means kilowatts or work out relative to Btus in) go from percentages in the low 30s for central station plants to more than 75 percent for generation and heat capture locally.

A second glaring example is not recapturing input energy into vehicles and other accelerated objects when they're braked. Isaac Newton taught us that the net energy in this acceleration/deceleration cycle is zero, adjusted only for system inefficiencies and losses. A good way to think about this is elevators. New ones recapture the energy on descent that was expended on ascent. The result is that we build Otis elevators today that use 75 percent less electric energy than comparable equipment in speed and load a decade ago. Said another way, a re-generative high rise elevator lifts a million pounds a day for an energy cost of a dollar an hour.

The third glaring example is heat transfer instead of heat dissipation. Realize first that air conditioning systems do not cool air in a direct sense like food in a refrigerator. Instead they move heat from one place (inside) to another place (outside). We measure the efficiency of air conditioning systems by Coefficient of Performance (COP). It's the amount of energy required to move another amount of energy (in this case the caloric content of the heat moved). Air conditioning systems worldwide work this way, and the COP is between three and four times. In other words, one unit of input energy is needed to move three or four units of energy or heat.

So how about heating hot water by heat transfer. We're learning an amazing statistic in a multiyear study of buildings worldwide with the World Business Council on Sustainable Development. First, buildings themselves account for about 40% of the world's total energy load. Inside buildings, hot water heating accounts for a remarkable 15% of their total energy demand. And we still do it the old way with direct or conductive insertion of heat into the water, just as we did thousands of years ago over the campfire. In other words with a COP of less than one, by definition. But it's also entirely feasible to heat hot water via heat transfer with COPs like air conditioning of three or four times. So energy can go down by 70 percent which means 10 percent or so less energy for buildings. Which is four percent for the planet! And paybacks are good too, between three and four years.

Yet another heat transfer opportunity is electric power generation from geothermal sources. UTC builds a unit generating a little over 200 kW, and we're about to launch one in the megawatt range. We can work with lower grade geothermal heat at about 165 degrees Fahrenheit, and according to the U.S. Geological Survey this source is enough to provide about 10% of the nation's energy load**.** And unlike wind or solar sources, the source doesn't shut off from time to time.

The point of all these examples is that energy conservation in significant amounts is feasible today and reflects the laws of physics. And not only feasible but with good financial returns.

Let's apply this to Connecticut for a moment. The State has a population of about 3.5 million using about a million buildings and three million cars. I'll skip the terawatt hours because nobody can keep track of the zeros and instead talk about energy loads in large power plant equivalents. On this basis, Connecticut needs about 31.

A little less than half of this energy load supports buildings, about 40 percent vehicles, and the balance industrial. Inside the 47 percent for buildings, about half or 24 percentage points is used for heating. Another eight percentage points each for lighting and hot water, four percentage points for equipment and appliances, and a surprisingly low three percentage points for air conditioning (recalling the comment about the efficiency of heat transfer above!).

So where do we start? First is setbacks on heating/cooling/lighting for residential and office space when not occupied in off hours during the day for residences and at night for commercial space. Both would save about 10 percent of their current total energy load, or about a power plant in total.

Another is the hot water heating example earlier. Another power plant. Another is re-generative elevators although their total energy load isn't enough to make the power plant savings meaningful. But we could extend the same reasoning to cars which would save at least three power plants. Bear in mind that hybrids do this already by capturing braking energy while re-charging the battery.

Fourth is to move more central station electricity generation to units on-site in buildings, enabling capture and use of the heat there for heating, air conditioning, and hot water. Another two power plants.

Together these are about seven plants out of Connecticut’s 31 equivalent total, or 23 percent. The saving won’t come cheaply with retrofits versus new construction but it’s what a greenfield state would look like, and lots of the gains can be had with attractive returns even on a retrofit basis.

Conservation in a company like ours can be achieved internally as well as designed into our products. Over the last decade, UTC has reduced its energy consumption (in kilowatts and Btus) by an amazing 20% even while the company has more than doubled in size. Our water consumption is down comparably 47%.

In summary, there’s too much talk about alternative energy sources and way not enough about conservation. And when there is talk about conservation it’s typically of the variety of “sleep in the cold, work in the dark.” I’m not talking about this at all, rather the simplest notions of getting rid of the waste and doing more with less. It’s a flat fact that most energy conversion processes are far from optimized, and that we can readily double or even triple these efficiencies of conversion. Look at our own operations with absolute energy down 20% on a company twice the size. Look at products like regenerative elevators, hot water heating via heat transfer, and recapture of otherwise waste heat literally all over the world, and the potential is clear and compelling. What’s held us back for a century is cheap energy, and now that prospect is changing and maybe forever. It’s time to use physics and the basic principle of more with less to change our world.