

Living Cool: Taking The Heat Out Of What We Do

by Walt Patterson

My most recent book is called *Electricity Vs Fire: The Fight For Our Future*. The paperback is available from Amazon, but you can also download *Electricity Vs Fire* free from my website archive, Walt Patterson On Energy - <www.waltpatterson.org> . Friends and colleagues who read the book told me 'Walt, it's really good, but it ends just when it's most exciting...!'. I had to confess: I was getting well out of my comfort zone, into topics I didn't yet understand well enough. I had to stop writing the book, for fear of making a fool of myself. Instead I had to do some serious homework.

Three years later, I'm making progress. Let me start with a vignette from my old friend, the American visionary Amory Lovins. Many years ago he told me 'There are three ways to make a good building material out of limestone. You can cut it into blocks. You can calcine it at 1200 Celsius to make cement. Or you can feed it to a chicken.' Weight for weight, eggshell is a very strong material. But we don't know how the chicken does it. And it does it at a chicken's body temperature, much like yours and mine.

As Amory pointed out, constructive natural processes take place at moderate temperatures. Trees make wood; animals make bone; a chicken makes eggshell, and so on. But humans learned how to start and control fire, with its inevitably high temperatures. We are the only animals that do this - that make practical use of high temperatures. As a result of fire, human activities have long diverged from those elsewhere in nature.

Until recently we have not thought of fire as a problem. In human evolution, what we can call the Fire Age predates us. Our Neanderthal forerunners had fire. We *Homo sapiens* evolved with fire. We think of fire as cosy and welcoming, hearth and home. Indeed, for many thousands of years we humans really needed fire. Some say that the two greatest human inventions were the wheel, and the control of fire. Using fire we could make light, letting us see after sunset. We learned to cook food. We learned to bake clay pottery to make it watertight and durable. We learned to smelt metals out of rocks, first lead and tin and copper and then iron and eventually steel. Then, three hundred years ago, Thomas Newcomen and James Watt found a way to use fire to exert forces and move things - the steam engine. Fire in steam engines, and then in other kinds of engine, transformed the way we live. Fire created the modern world, the one that you and I now live in.

But fire is a violent, extreme process. It produces the heat we want, but at a temperature so high it's dangerous. Fire rapidly turns resources, especially the fossil hydrocarbons, into waste. Much of this waste - smoke, particulates, sulphur and nitrogen oxides, possibly mercury and polycyclic hydrocarbons, depending on the fuel - is suffocating or toxic, making city air unbreathable and poisoning forests far away. The consequences are more and more alarming. We have always known that fire is dangerous. But so is what fire leaves behind. Fire is making city air toxic. Fire is the reason you can't breathe in Delhi or Beijing, the reason why even the air in London and other UK cities fails the tests of the World Health Organization. The danger is not only local but global. The need to feed fire triggers international tension. Waste from fire, especially carbon dioxide, is relentlessly overheating and upsetting the climate of our only planet. We have let fire get out of control.

As the problems fire causes have become ever more acute, for many years now I have found myself pondering how human activities might converge back toward natural processes, with their moderate temperatures, without fire. I came to realize that fire's greatest contribution may be that it has given us the materials with which to produce and control electricity. To get human activities back in sync with nature, electricity is the key. We now use electricity to do what we used to do with fire. As I described in *Electricity Vs Fire*, with electricity we can now produce heat or cold, make light, cook food, manipulate materials, exert force, move things and - ever more important - manage information. To do almost everything we want to do, we no longer need fire. Electricity is clean, versatile and controllable. Unlike fire, electricity is not a chemical but a physical process. Electricity does not destroy what it happens in. Electricity does not poison the air or overheat the planet.

Unfortunately, however, we have an obvious problem: we still make most of our electricity with fire. We don't have to. Alessandro Volta showed us how to make electricity with chemistry, Michael Faraday how to make it by moving a wire in a magnetic field. Now we can make fire-free electricity with wind and water and even with sunlight. But our politicians and planners still think using fire is cheaper, even as it strangles our cities, makes our weather ever more extreme, triggers floods and droughts, threatens water supplies and drowns our coastlines.

The solution is obvious. We have to switch from using fire to using electricity, especially in transport and industry; to switch from fire-based to fire-free electricity; and to curb our extravagant waste of both fire and electricity. My book *Electricity Vs Fire* explored some implications, but merely hinted at others, profound and serious. That was why I had to stop writing the book where I did. I knew I was getting out of my depth, into issues I did not understand well enough.

If you read *Electricity Vs Fire* you'll see what I mean. The question is no longer just about energy, or even about human activity systems. It is about the basis of human society - how we humans, more than seven billion of us, live together on this, our only planet. Within the past century we have stumbled into a social transaction system, a global economy, modeled on fire, what we can call a Fire Economy. In this Fire Economy you and I function like fire, as 'consumers', using things up, turning resources into waste as fast as possible. This is supposed to be beneficial, producing economic growth, the watchword of economists, politicians and planners everywhere. It is deeply misguided. On a finite planet it cannot last. We are already seeing all too many symptoms of systems breaking down, including the systems that make human civilization possible. This has to change, before it is too late.

Can we develop instead a long-term vision of a human society that functions like nature? Can we devise a human society that cycles resources as nature does, that uses moderate temperatures and very little fire, using fire-free electricity for most of our human activities? Can we create a new story about human life on earth?

I hope we can, and I hope we can do it while we still have time. But this raises profound questions: about social organization, values, structures and systems. We have to look closely not only at human activity systems, as I discussed in *Electricity Vs Fire*, but also at human behaviour systems, our individual and collective behaviour: not only what we humans do and how we do it, but why we do it - why you do it, why I do it. That affects the choices we make and the decisions we implement, through the human activity systems in which we use fire and electricity. How do we decide what to do, and how to do it? Is it based on habit and inertia, on persuasion, on initiative? Is it based on coercion, forcing us to do what we do not want to do? What assumptions do we make? What do we

ignore? What consequences do we anticipate? What about unintended consequences, so often inevitable, unexpected and unwelcome?

We face new challenges about resource management, not least because we now have to grapple with unfamiliar resources such as wind and sunlight. We have always used them; but now they have acquired monetary commercial value, as ways to generate fire-free electricity in what, for the moment at least, is a market in which we buy and sell electricity. Suddenly we are plunged into a whole new category of resource geopolitics. Will countries rich in wind or solar resources be the next OPEC, as fire-based electricity is overtaken by fire-free electricity?

Governments give lip service to the clumsy phrase 'sustainable development', the concept that we should pass on to our descendants a planet in at least as good condition as we received it from our precursors. Instead, however, we are making a mess of it. Meanwhile the disparity between the haves and the have-nots gapes ever wider, the one percent enjoying luxuriant abundance while the ninety-nine percent fall ever farther behind. The actual decisions made by governments and corporations, the practical exercise of their power, all too often betray the hollowness of their rhetoric.

But the very word 'power' now has a striking corollary. In the English language, electricity is power - think of power lines and power stations. Historically, electricity has been the quintessential centralized power system, not only technically but politically, with centralized decision-making over which electricity users have no control whatever. In many parts of the world this situation still prevails. Elsewhere, however, electricity is undergoing a dramatic transition, away from a centralized to a much more decentralized configuration - again not just technically but politically. In southeastern Australia, for example, millions of electricity users installed solar photovoltaics on their roofs to reduce their dependence on the central monopoly supplier. To recover its investment the supplier raised the rates - prompting users to add batteries to their solar arrays and disconnect completely from the central system. Similar developments are under way in the southwestern United States, to the dismay of the central suppliers, who see their political power and even their commercial survival under threat.

Will this trend toward decentralized electricity, perhaps with microgrids or other local configurations, become more widespread? It may, for instance, be the best option for those billion or more of our fellow humans still without even electric light. However, in countries such as India, China and parts of Africa and Latin America, local decentralized renewable electricity could further weaken the hold of the inefficient and often corrupt state electricity bureaucracies. That of course is why these bureaucracies often offer stubborn opposition to decentralized renewables - yet another aspect of the global power struggle now raging.

Chatham House in London, where I am an associate fellow, has long devoted its attention to questions such as these. Grappling with them, I'm now trying to develop the next phase of this new human story in book form. A work in progress, it will be a follow-up to *Electricity Vs Fire*, with the provisional title *Living Cool: Taking The Heat Out Of What We Do*. As I said, it requires homework - a lot of homework, because so many thoughtful people have been here before me.

Think of the many problems we have to solve. Just listing them is daunting: climate change; inequality; air pollution; water pollution; waste; poverty; hunger; water scarcity; work, what it means and what it's for; mobility of people and goods; nuclear weapons; weapons generally; loss of biodiversity; loss and degradation of soil; extinction ...

How do you confront such a vast panoply of threats? I suspect that most if not all are actually symptoms of a common underlying pathology. It may arise as a consequence of our deviation from the rest of nature, our failure to recognize our interdependence with our planetary surroundings and to act accordingly. As yet, however, I am still feeling my way into this.

What decisions will lead us in the direction of 'living cool'? How do we arrive at the optimal choices of infrastructure, the optimal uses of resources? We have to tackle questions of ownership, investment, value systems and structures that are absolutely fundamental to the global organization of our human society. If we manage it in time, before fire and its consequences prevail, what gradually takes shape may look very different from society as we know it today, in any part of the world.

But wrestling with this ultimate challenge is engrossing and inspiring, not least because - in this fight to save ourselves and our planet - we may actually be winning. Fire-free electricity, especially wind power and solar power, is growing rapidly cheaper; so are batteries, to store this fire-free electricity for use whenever we want it. Whole-system thinking, optimizing everything - buildings, illumination, heaters, chillers, motors, electronics, vehicles - makes ever more sense. The 'circular economy', designing and life-cycle planning for maximum efficient use and reuse of resources, is already on official agendas around the world. I've long had a vision of a future society in which human activities are driven not by fire, fuel and high temperatures, but by electricity in infrastructure. The technical possibilities are now ever more promising. More and more people everywhere now share this exhilarating vision of a cooler future.

Nevertheless we are still a long way from fathoming the social and political implications of such a vision. At the same time, of course, the fire-feeders are redoubling their efforts to thwart it, led by the malevolent presence in the White House. Far too many new coal-fired power plants are still under construction and planned. Fossil fuels and nuclear power - a process even more violent than fire - continue to receive far more subsidies than fire-free electricity. Banks and other financial players continue to fund projects and activities that aggravate the problem. But that too may be changing. The divestment movement is making inroads into endowments and pension funds. Intelligent and responsible investors now recognize the risks of backing fire-based activities, and the burgeoning opportunities for fire-free investments, in trillions of dollars.

However, we face fierce opposition from those who derive financial and political clout from feeding fire. We are in a naked power struggle, worldwide, in which power - electric power - is a key battleground. As always, the fight for the future may be disguised as economics but is fundamentally political - a political battle we can't afford to lose. To keep our air safe enough to breathe, to keep our only planet cool enough to live on, we have to put out the fire.