

## Rethink Energy - Rethink Efficiency

Presentation by Walt Patterson

When you say 'energy', what do you mean? Do you ever think about it? You should. Too many of us say 'energy' when we really mean oil; or coal; or natural gas; or electricity. They are not the same, not interchangeable. But lumping them all together and calling them all 'energy' makes too many people, especially politicians, think they are the same - that one can substitute for another. We talk about 'energy supply', when we really mean 'oil supply' - not the same as 'gas supply' or 'electricity supply'.

Why do we need these supplies? That is the key detail we so often ignore. We need fuels and electricity to *run things*. What matters are the *things* - lamps, motors, electronics, appliances, industrial plant, vehicles and especially buildings. These things, these physical artefacts, actually do for us what we want to do.

In purely physical terms everything we do, everything humans have ever done, falls into just six categories. First of all, we control heat flow, using physical things: you put on a sweater to keep warm, or open the window to let the heat out. Second, we adjust local temperature: you turn the thermostat up or down. Third, we make light: you strike a match, or switch on an electric lamp. Fourth, we exert force: you lift a weight or open a door. Fifth, we move things: you push a pram or pull a wagon. Sixth, but perhaps the most important, we manage information: you talk and listen, now not only in person but ever more remotely, with ever more ingenious devices. For these six activities we use physical things, and two processes - fire and electricity. Keep those processes in mind.

These six physical activities give what we actually want - comfort, illumination, motive power, refrigeration, mobility, information, communication. We can call these 'energy services'. But even that is misleading, as if the so-called 'energy' - the fuel or electricity - provided the service. It does not. In these activities the most important factor is the things, the physical things - not the fuel or electricity. Oil by itself is almost useless. Natural gas by itself is downright dangerous. Electricity as we use it does not even exist by itself. It's a process in things. Fuels are only useful because of things - the physical artefacts that do what we want to do.

The free-market enthusiasts that have shaped energy policy for the past quarter-century talk a lot about competition. But they miss the point. The real competition, the competition that matters, is between fuel and things - the things that do what we want to do. Better things - lamps, motors, electronics and especially buildings - need less fuel to give us the same or better services. Fuel and things compete directly with each other. Key competitors for ExxonMobil are not Shell nor BP but Toyota and Volkswagen. Competitors for Gazprom are Europe's manufacturers and installers of thermal insulation. Competitors for EDF and E.ON are the manufacturers of LED lamps; and so on.

What we call 'energy policy' today still concentrates on fuels and electricity - what we used to call 'fuel and power policy'. It takes the things for granted and ignores them, except as aggregates and

averages of so-called 'energy demand'. But we do not have 'energy demand', or an 'energy problem'. We have many different, specific and distinct problems: how best to carry out many different activities all over the world, with many different specific things, that may - or may not - require specific fuel or electricity. Effective policy should foster this crucial competition between *fuel* and *things*. Over the years we have burdened ourselves with a vast array of inadequate things, especially inadequate buildings. But instead of making the buildings better we pour more and more fuel and electricity into them. That is like opening the bathtaps wider without putting in the plug.

We talk a lot about what we call 'energy efficiency'. In practice, however, when people talk about 'energy efficiency', they mean how well something uses fuel or electricity. But this kind of energy efficiency tells you nothing about how well the thing does for you what you want it to do. A well-designed house in a temperate climate, such as a German 'passive house', can keep you comfortable year-round with no fuel or electricity at all. 'Efficiency' as the term is commonly used would be meaningless.

We have to stop focusing obsessively on fuel and electricity. Efficiency is not about 'energy', about fuel and electricity - it's about *things*, making *things* better, so we need less fuel and electricity to do what we do, and do it better. The primary objective of a coherent strategy for climate, security and affordability should be to upgrade the things that do for us what we want to do, especially our built infrastructure. Then, while we are improving the things, the physical assets, we should also look much more carefully at the two processes they use - fire and electricity.

We still think of fire as welcoming, reassuring, cosy. But it is actually a violent, extreme process, brutal and primitive, rapidly turning resources into wastes, often toxic and pernicious. Nevertheless we still rely on fire for most of our activities - even when we need not, and despite the ever intensifying problems fire creates. To address these problems - pollution, security, climate - we should aim to reduce and eventually minimize human use of fire.

However, because we have evolved with fire, we have long taken for granted its deleterious consequences. We still, for instance, consider coal-fired heat and electricity to be cheap, even as coal fire makes the air of cities suffocating, and threatens the stability of the earth's climate. We need to acknowledge and account for the true cost of fire. If we do not, spurious comparisons of cost will lead us to choose disaster.

Even if we do try to account for the true cost of fire, moving beyond this Fire Age will not be easy. Fire plays a central role in today's global economy. Some of the world's largest companies, and indeed entire countries, depend for their revenue on feeding fire. We already have a vast worldwide infrastructure, buildings, industrial plant and power stations, that could not function without fire. We have laid out society so that we now depend for mobility on fire, in cars, trucks, ships and aircraft. Nevertheless we use fire in many unnecessary ways, to compensate for instance for the inadequacy of buildings. Simply improving buildings could reduce dramatically our use of fire.

The other key to the transformation we need is electricity. For the past century electricity has been steadily supplanting fire for many human activities, with electric heaters and coolers to adjust local temperature, electric lamps for light, electric motors to exert force and move things, and electronics to manage information. But we still make most of the electricity itself with fire. We don't need to. We can also harvest natural energy flows, from sun, wind and water, as useful electricity, and we are doing so more and more, around the world. Electricity as a process can now be completely independent of fire. We need urgently to accelerate the shift away from fire-based electricity to what we have come to call renewable electricity. A more telling description is 'fire-free electricity' -

physical assets such as wind turbines and photovoltaic arrays that turn natural ambient energy into useful electricity.

We need to establish financial and institutional ground-rules and incentives to make fire-free electricity the norm, and phase out electricity based on fire. That can start - indeed has already started - with governments. National governments are laggards. But city governments around the world are already showing the way. They have realized that their most effective leverage is not legislation or regulation. It is their role as major users of fire and electricity - highly desirable customers, who can define the business they want to do and the contracts they offer. They are upgrading their own buildings; replacing public lighting with LEDs; installing local electricity generation and cogeneration, heat networks, private-wire networks and microgrids; and publicizing these and similar projects as demonstrations for private industry and private citizens.

The crucial innovation we need is a new mindset, a new way to think about what we do and how we do it. That will give us the essential new business models. Real energy policy is not about commodities but about infrastructure. Some of the biggest infrastructure companies in the world, for instance, are the global oil companies. Their existing business model, feeding fire, has to change. They could instead become key providers of better infrastructure, including the infrastructure for fire-free electricity.

Enlightened governments and companies, working together, can transform the ways we do what we do. The opportunity is obvious. Let's seize it.

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