Quality Urban Energy Systems for Tomorrow (QUEST), Winnipeg, 18-21 November 2012

QUEST For Better

Presentation by Walt Patterson

Fifty-three years ago, a young rosy-cheeked lad fresh from the University of Manitoba, I set out into the wide world to seek my fortune. In those days, if you were from Winnipeg, that was what you did. Unlike some of my contemporaries, however, I did not wind up in Hollywood or on Broadway. I arrived in England, where I met my late beloved English wife Cleone. In 1968 we had a visit from another Winnipegger, a friend of mine called Bob Hunter, who told us enthusiastically about something recently discovered on the west coast of Canada. It was called 'the environment'. With Cleone's backing I soon found myself settling into a life of trouble-making. I'm still at it. This evening I'm even going to try to make life a bit more complicated for some of your esteemed sponsors.

Some of you may know that Hunter became the founder-president of an organization called Greenpeace. I in turn became - to my surprise - what came to be called the first 'energy campaigner' for the UK wing of an organization called Friends of the Earth. Ever since the late 1960s I have been writing, speaking and campaigning about what we call 'energy'. Then, less than five years ago, I realized I had picked the wrong target.

We are all now increasingly concerned about security and climate. But our problem is not 'energy'. I'm a lapsed nuclear physicist. The University of Manitoba might now disown me; but they taught me what 'energy' means. Energy makes the universe go round. Our problem is not energy. It is quite specifically 'fuel'. Remember fuel? That was what we called it before 1973. In those days governments had what they called 'fuel and power policy'. It focused on supplies and prices of coal, petroleum, natural gas and electricity. Today's so-called 'energy policy' still does. The 'energy security' that now worries politicians around the world is security of supply of fuel, particularly oil and natural gas. The carbon dioxide perturbing the climate comes from burning fuel, particularly coal oil, and natural gas. If we want to reduce our vulnerability to disruption, the rational response must be to reduce our use of fuel.

To experienced energy people, including many here tonight, that will sound nonsensical. Enormous companies and even entire countries depend for their revenue on producing, processing and selling fuel. The so-called 'energy market' is actually a commodity market, buying and selling fuel in short-term batch transactions, in which the most important detail is the unit price. Fuel is a trillion-dollar global business - and Canada is a major player.

Why, however, do we need this fuel? We need it to run the user-technology that actually provides the services we want - buildings, fittings, appliances, industrial plant, electronics, vehicles, the user-infrastructure of modern society, especially in cities. Today's energy policy lays great stress on competition, to improve the economics of energy use. But the most important competition is not between different suppliers of the same fuel. The most important competition is between fuel and user-technology. The better the user-technology, the less fuel it needs to deliver the services we want. But the business model of traditional fuel suppliers means that they actually benefit from

having us customers waste fuel, by using it in inefficient user-technology. This perverse incentive permeates the whole of traditional so-called energy. Governments and companies now strive ever harder to produce ever more fuel and electricity, much of which we continue to waste in poor user-technology and infrastructure.

If we really want to reduce our vulnerability to the problems created by fuel, we can do so in two parallel ways. We need to get serious about minimizing waste: to make profitable business out of upgrading existing user-technology and infrastructure - especially the most important energy technology of all, which is buildings, as we have been hearing at this conference. We also need to recognize that we use two kinds of electricity. One we base on burning fuel, especially coal and natural gas. The other we base on harvesting natural energy flows, turning them into useful electricity and heat, including hydroelectricity, wind, solar thermal, solar photovoltaic, geothermal and marine energy. This energy does not use fuel. Most people call it 'renewable'. I like to call it 'infrastructure energy'. You design a physical asset, invest in it, manufacture and install it. It becomes part of the infrastructure - infrastructure that delivers useful electricity and heat, with no subsequent fuel cost and minimal running cost.

We need a more balanced view, focusing not on fuel alone but including the whole energy system, and especially the user-technology. We need to optimize the entire process that delivers the services we want. We need to invest everywhere on the system, especially at the user-end. We need business models that provide the right incentives, not only to supply fuel, electricity and heat but also to use them in high-performance user-technology.

The fuel business will certainly continue, particularly for transport. I hope and expect it will expand to include much more creative use of biomass, by gasification for electricity and by using algae, for instance, for liquid fuel. But effective models for tomorrow's energy business must also foster innovative engineering design and construction of user-technology, especially buildings - particularly including refurbishment and upgrades of existing buildings. As we've been hearing at this conference, urban energy systems in sustainable cities will also include heat pumps; on-site generation, cogeneration and trigeneration; and infrastructure electricity and heat of every kind, as well as system sensing and control technology and network technology, especially for integrated local energy systems.

The skills we need will not be those for marketing or commodity trading, but rather those to create and invest in physical assets and infrastructure - in particular engineering, project management and project finance. The engineering, moreover, will itself be innovative - not just traditional combustion engineering and electrical engineering but fluid dynamics, surface physics, exotic materials, control sensors and software, nanotechnology, complexity and many other novel disciplines.

The biggest transformation will be in electricity. Traditional electricity is based on enormous remote and often dirty power stations feeding long, unsightly and vulnerable power lines, a technical model more than a century old, inelegant, inadequate and obsolete. Nuclear power is the ultimate in traditional electricity - slow, costly, narrow, inflexible and risky, both financially and environmentally. Innovative electricity by contrast, will be much more decentralized, with a great deal of small, clean generation close to users, more and more of it infrastructure electricity. The system will be heavily instrumented. Generators and loads will talk to each other in real time. Control technology will keep the system stable with minimal need for intervention. Concepts such as 'base load' and 'despatching' will fade out of the picture. So will the electricity meter.

I have a small house on a tiny Greek island. I was there two weeks ago, preparing to speak to you. The house has a single photovoltaic panel on the roof, and a bank of batteries. One bright midday I was sitting at a table by the window, writing on my netbook computer, plugged into the solar electric system. I remembered something I wanted in the village. I was about to switch off the computer when I suddenly thought 'Why bother? It's plugged into the sun.'

Transforming electricity will not happen quickly. We still rely on what Americans call legacy assets to keep our lights on, and that will not change over night. But minds can change much more rapidly. The first step toward Quality Urban Energy Systems for Tomorrow, for the QUEST I share with you, must be to change the way we think about them.

If we get this right, our descendents may even go further, to make human energy systems converge toward natural energy systems. My old friend Amory Lovins used to say that we know 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 one of the strongest materials we know. But we don't know how the chicken does it. And it does it at a chicken's body temperature. Our human energy systems still rely far too much on brute force, on high temperatures and violent phenomena, on fire and fuel. Natural processes can also be violent and destructive - but creative natural processes are subtle and elegant. We still have a lot to learn. It's going to be exciting.

To those of you whose lives and careers still focus on fuel, let me therefore make an urgent plea. This transition is happening. It will make your traditional business ever more risky. But we need you. We need your experience and expertise in long-term planning, in infrastructure investment and in system thinking. We need you to expand your horizons. We need you to think in whole systems, not just fuel. We need you to update your business plans, to seize these exciting opportunities. So don't just sponsor QUEST. Make smart energy your business. Let's change the world together, for the better.