

*(from Energy World, February 2014)*

## Looking back to look forward

Responses by Walt Patterson

### Questions

1. From your own perspective, how would you characterise the key challenges facing the energy industry and society today?

What now calls itself the 'energy industry' is still almost entirely what used to be called 'fuel and power supply'. Its traditional business model is now failing its customers, itself and the planet. Its revenue stream depends on the commodity business of selling ever more units of fuel and electricity. But its customers do not want fuel or electricity. They want comfort, cooked food, illumination, motive power, refrigeration, mobility and information. They get these services not from fuel and electricity alone but from user-technology - buildings, lamps, motors, vehicles, electronics and so on. The better the user-technology, the less fuel and electricity it requires to deliver the services. But that runs counter to the business model of the 'energy industry'.

As a result, we still have gravely inadequate buildings and other user-technology all over the planet. Feeding fires in houses, boilers, furnaces, power stations and vehicles makes air in many cities all but unbreathable. Acid rain from fires poisons waterways and kills forests. Carbon dioxide from fires is perturbing the global climate and acidifying the oceans. We urgently need to change the ruling assumptions of energy policy worldwide.

We need governments and companies to focus not on commodity trading of fuel and electricity but on providing the services we actually need. That includes, as top priority for real 'energy policy', upgrading our user-technology, especially buildings, as a profitable business, enlisting the requisite investment, materials and skills. Many innovative business models to do so are now emerging. At the same time we need to reduce our use of fire, with its dangerous consequences. As well as minimizing waste, we need to accelerate the shift away from electricity based on fire and fuel, especially coal, to infrastructure electricity, including wind power, solar power and hydroelectricity, especially small-scale, decentralized and local. To do so we need to change regulatory objectives, business models and financial arrangements, to foster the necessary shift in focus. Fortunately such innovative changes are already happening in many places. Unfortunately they are not happening fast enough.

2. How can we use the experience of the past to plot the future? (Given hindsight, have mistakes been made in the past, and are we learning from these?)

See answer to Q1: yes, mistakes have been made, going back more than a century. For instance: Thomas Edison's early electricity system charged customers according to how many lamps they had. He was selling illumination - what people wanted. He had to optimize the entire system - steam engine, generator, cables, switches and lamps - to keep it somewhat less dauntingly expensive. Then, in the mid-1880s, came the invention of the electricity meter. Suddenly Edison and other electric entrepreneurs were no longer selling illumination. They were selling electricity. Suddenly they made more money if customers used inefficient lamps, because customers then had to buy more electricity for the same service. That perverse incentive still applies, not only to electricity but across the whole so-called 'energy market', well over a century later. But we now devote enormous effort to this 'market', selling electricity and fuel by the unit, which actively militates against improving user-technology. The lessons are there, mostly from past mistakes; but we have yet to learn enough from them.

3. Please comment on the energy policy 'trilemma' – the need to balance supply security, affordability and sustainability?

The 'supply security' that matters is secure supply of the services we actually want - for instance keeping the lights on. The better our user-technology, requiring less fuel or electricity for the desired services, the less vulnerable we are to disruption of supply of fuel or electricity. Affordability means the bill, not the unit price. If you use less fuel or electricity, a higher unit price may still be a lower bill. In most contexts, using better user-technology and less fuel and electricity is more sustainable throughout the life-cycle of the service, from extraction and fabrication of materials through operating emissions to final disposal of system assets and wastes. But our present ground-rules, regulatory and financial, bring about rapid conversion of resources into waste, by fire and premature obsolescence, with cumulative deleterious side-effects whose consequences grow ever more alarming, locally and globally. The 'trilemma' as defined makes unfounded assumptions that prematurely eliminate optimal solutions.

4. Is a satisfactory balance achievable? What are the major constraints?

If a satisfactory balance is not achievable we and our descendants are in serious trouble. Even at this late date it should still be achievable. But it will require initiative and courage from those who make the ground-rules. They will have to face down those who oppose change and are using media disinformation, hyperbole and threats to keep their short-term advantages, despite the long-term devastation they are making probable.

5. In a time of rising energy demand, how should supply side issues interact with demand side needs?

'Supply' and 'demand' as traditionally understood are the wrong criteria. They refer only to fuel and electricity, not to the services we desire. This traditional approach is part of the problem. To supply services with optimal reliability, cost and environmental impact we need to take a whole-system approach, including appropriate ground-rules for technology, regulation and business relationships. The policy literature now abounds with innovative ideas for these new ground-rules; some are already being put into practice, notably in the US and parts of continental Europe. But the traditional mind-set is deeply ingrained, resisting innovation and opposing change, despite the increasingly obvious failures of the traditional approach.

6. What can – and should – governments, regulators and the energy industry itself do to meet the challenges?

They need to redefine how they view the policy challenges. They should regard them as opportunities, to take advantage of the many innovations now emerging, for instance new materials and techniques, sensors and controls to upgrade building performance; advances in user-technology of all kinds, especially for dynamic interaction with energy networks; innovative generation and network technology for electricity; innovative regulatory arrangements and policies, to provide incentives to invest in and operate more reliable, cleaner systems; and above all new business models and business relationships to seize these opportunities.

Governments in particular should take the lead, not as legislators and regulators but as major energy users. They can set an essential example. By calling for tenders and making suitable contracts they can upgrade their own buildings, vehicles and other facilities, as a coherent strategic programme. They can establish integrated optimized local systems, including on-site generation, cogeneration and trigeneration; and they can publicize the results, continuously, to demonstrate the potential for improvement, to inform and enlighten private industry, commerce and finance, and to save taxpayers' money.

7. How could professional bodies contribute?

Professional bodies should take the initiative to help accelerate the change of mind-set we need. They can foster education and dissemination of information. They can establish more effective definitions of problems and opportunities. They can analyse and publicise case-studies of failures and successes; and they can revise and update criteria for the requisite competences and qualifications for those professionals who will create our innovative energy futures.

8. Are you optimistic, overall, about prospects for the future?

I'm always optimistic, by nature. But the need for change is urgent, and time grows ever shorter. We can still choose to make our global future abundant, equitable and sustainable. But will we?

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