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The Emperor's Nuclear Clothes

Presentation by Walt Patterson

Why am I standing here? I have no idea. Why are you all sitting here? I can't understand that either. But here we all are. For some reason that escapes me, we're here to talk about nuclear power. I thought everything that needed to be said had been said, at least fifteen years ago. In fact, of course, it was. Much of it, indeed, was said in the 1970s, and repeated through the 1980s. Apparently, however, it now needs to be said yet again. If I sound unenthusiastic today, I hope you'll forgive me. I've been there and done this far too often in far too many places to take any great pleasure in doing it all over again here today.

I'd far sooner talk to you about the exciting, exhilarating developments in innovative electricity that I've been working on for more than a decade. Unfortunately, however, the return of nuclear foolishness may derail what I think could be the most promising breakthrough in energy since the discovery of petroleum. Instead we seem to getting ready to swallow all over again the hype, the half-truths and the self-delusion of the nuclear snake-oil salesmen.

Their pitch has been the same since the 1970s: 'The answer is nuclear power! Now what was the question?' For more than three decades nuclear lobbyists have adopted the same stance. No matter what the question, the answer is always nuclear power. 'What? OPEC raised the oil price? The answer is nuclear power.' 'What? The Shah of Iran has been overthrown? The answer is nuclear power.' 'What? Carbon dioxide from fossil fuels is upsetting the climate? The answer is nuclear power.' 'What? Russian gas is unreliable? The answer is nuclear power.' 'What? Junior won't eat his vegetables? The answer is nuclear power.'

Over the decades the opportunistic nuclear litany becomes tedious. Unfortunately, however, we now have yet another batch of politicians, journalists and indeed environmentalists who appear to know no history. They have forgotten, or never known, the staggering sums of taxpayers' money poured into the nuclear black hole, in the UK as elsewhere, the arrogant incompetence of those spending it, the endless failures and futility. Last December, after I had kicked and struggled for many months, I at last allowed myself to be sucked back into the nuclear morass I thought I had escaped fifteen years ago. My wife at last persuaded me to put together a website archive of my writing for the past 35 years. From 1970 through 1990 much of it was devoted to nuclear matters, as my colleagues and I tried to cut through the fog of smug overconfidence, misinformation and downright dishonesty that obscured the reality. Here today I'll revisit some of the history; but if you want to know more, and I hope you do, please consult my new website archive, Walt Patterson On Energy. The URL is easy - <www.waltpatterson.org>.

Let's start with some basics. The UK, for example, has never built a nuclear power station on schedule, or within budget, or that worked according to its original specifications - not once. All but the earliest stations were not merely months but years late in even starting up, much less reaching their intended output. All went over budget, sometimes impressively. But schedule and cost overruns for nuclear plants were not just a UK problem. In the US, for instance, the most aggressive government promoter of nuclear power, the surge of orders in the early 1970s was followed immediately by delays and cost overruns, double or even triple original estimates, that nearly bankrupted several investor-owned utilities. Many small municipalities in the northwestern US are still paying, more than 20 years later, for the largest bond default in US history, more than $2

billion, caused by the five nuclear plants ordered by the Washington Public Power Supply System, WPPSS, pronounced WOOPS. Since 1978 no US company has ordered a new nuclear plant; and every one ordered since 1974 - more than 30 years ago - has since been cancelled, sometimes when almost complete. To be sure, some experience has been more satisfactory - that, for instance, in Finland. But a great deal has been even less so, including for instance Canada, Brazil, India and Pakistan.

Since the 1950s, only the original reactor concepts, created for military purposes and with massive subventions from taxpayers - submarine power plants and reactors to produce weapons-plutonium - have succeeded; and even that success is relative. Japan's fleet of light-water reactors have given the country the highest electricity prices in the OECD. France is often acclaimed as the poster-child for nuclear power. But the finances of Electricite de France are impenetrable. Occasional glimpses suggest extraordinarily lenient accounting for its awesome nuclear investment. Nor can anyone say with confidence what France will have to pay to decommission some 60 large units.

Every innovative purely civil reactor design ever attempted has failed, often egregiously, to live up to its billing, either technically or financially or both. The dismal catalogue includes all the various early concept reactors in the US; so-called 'advanced gas-cooled reactors' in the UK; high-temperature gas-cooled reactors in the US, the UK and Germany; heavy-water reactors in the UK, Canada, Japan and Argentina; RBMK reactors, the Chernobyl design, in the Soviet Union; and - most spectacularly - the entire fleet of plutonium-fuelled fast breeder reactors all over the world, in the US, the UK, France, Germany, Japan, the Soviet Union and India, undoubtedly the most extravagantly futile so-called 'energy technology' ever funded by hapless taxpayers.

Mention of the fast breeder reminds me that nuclear advocates still blithely refer to what they call 'the nuclear fuel cycle'. This is yet another example of nuclear wishful thinking. Civil nuclear power arose in the 1950s, supported on the back of vast investments by governments - that is, taxpayers - in uranium extraction and processing for nuclear weapons. The technologies involved - uranium mining and milling, hexafluoride conversion, enrichment, fuel fabrication and reprocessing - entailed enormous industrial installations carrying out processes that were then taken for granted as part of civil nuclear power programmes. In a civil reactor, too, the chain reaction turned some uranium into plutonium. For civil purposes this plutonium could be recovered and used in fresh fuel. In this way the fuel could go around a 'cycle', from reactor to reprocessing to plutonium fuel and back to reactor, repeatedly. Like so many nuclear ideas it sounds really attractive on paper. The difficulties arise when you try to turn the paper into reality.

The reality of the so-called 'nuclear fuel cycle' includes at least two techologies - oxide-fuel reprocessing and fast breeder reactors - that have proved impossible to implement, either technically or economically, despite decades of ten-digit expenditure by governments, taxpayers and electricity users. That underlines another awkward attribute of nuclear power in general. A nuclear power programme entails an array of industrial activities on a vast scale and over a timescale of many decades, interlinked and interdependent, with no applications outside the nuclear regime, civil and military. The risk of mismatch between, say, uranium mining, uranium enrichment and reactor construction, to say nothing of waste management, is long since all too apparent, with risks and costs to make private investors recoil. Keeping everything in step can be done only with central control, with unlimited access to taxpayers' wallets. It is, to put it bluntly, megalomaniac technology, requiring a long-term commitment of single-minded political will that has little to do with a market economy in a democratic society.

Does that strike you as too severe? Some of you may remember Walter Marshall - Sir Walter, later Lord Marshall, raised to the peerage by Mrs Thatcher. For a decade and a half his was the most influential nuclear voice in the UK. In the US his opposite number was Chauncey Starr, long-time

head of the Electric Power Research Institute. In the late 1970s Marshall and Starr pronounced themselves worried by the plutonium - potential weapons-material - accumulating in spent fuel ponds at nuclear stations around the world. In 1978 they held a press conference in Washington to announce their solution. Marshall and Starr proposed that the nuclear weapons states, including of course the UK and the US, should build vast maximum-security nuclear reservations. Each reservation would include a cluster of enormous plants - reprocessing plants, uranium and plutonium fuel fabrication plants and fast-breeder reactor power stations. All the non-nuclear-weapons states would send their spent fuel to these reservations. It would be reprocessed, and its plutonium recycled into fast breeder fuel and reused inside the reservation to generate electricity. In return the non-nuclear-weapons states would receive fresh uranium fuel for their own conventional nuclear plants.

Does this concept strike you as attractive? Perhaps. Does it strike you as feasible? It does? You must be joking. But Marshall and Starr were not joking. They were absolutely serious. They genuinely believed they could organize the entire world's nuclear and electricity activities in this way. Given that nuclear activities have been for five decades the most diplomatically touchy industrial activities on the planet, you can probably guess that their plan sank without trace. But the fact that they could advance it in all seriousness reveals that their grasp on practical reality needed a lot of work.

Ah, but all that happened three decades ago, you say. Things are more sensible now. Do you think so? In January this year the Washington Post reported that the Bush administration wants to resurrect this idea - resuscitating nuclear power, importing and reprocessing foreign fuel, fast breeders, the entire loopy package. President Bush's deal with India, meanwhile, leaves India's plutonium-fueled fast breeder outside safeguards. As far as civil nuclear power is concerned, the track record of India's Department of Atomic Energy for at least three decades is one of overweening arrogance and abject futility. But it gave India nuclear weapons. In the eyes of successive Indian governments the Department of Atomic Energy is sacrosanct.

Nowhere in the world is the overlap between nuclear power and nuclear weapons more blatant. But blatant or not, the link is there. Nothing so much upsets advocates of nuclear power as to be reminded of the weapons connection. But weapons gave nuclear power its start, and in much of the world weapons keeps it going. Without the weapons connection nuclear power would long since have vanished into the murk of its own contradictions, leaving only a radioactive mess behind.

Throughout the 1970s and 1980s I spent some two decades in nuclear controversy. I was often invited to be the token weirdo at nuclear conferences, the only unbeliever in a roomful of nuclear fundamentalists. Nothing I could say could sway their faith. They included, I should add, many genuine and capable people, devoting their careers to what they saw as a great cause for humanity. They were puzzled and hurt that I did not share their dedication; and I respected them for it. But the results, the results... My American friend and colleague Amory Lovins likes to quote John Maynard Keynes: 'If a thing is not worth doing, it is not worth doing well'. After fifty years of effort, the historical record has long since convinced me that nuclear power, for all its promise, is simply not worth doing.

If you were expecting a dispassionate factual analysis here today, my apologies. I learned as long ago as the outcome of the Windscale inquiry in 1978 that when the issue is nuclear power dispassionate factual analysis is a waste of time. Any rational comparison of nuclear power with the vast catalogue of other energy possibilities now available to us leaves nuclear power at the bottom of the list. If you are concerned about climate change or energy security, why pick the slowest, most expensive, most inflexible and riskiest option?

But the nuclear hucksters are subtle and persistent. As the title of today's lecture indicates, in this bicentennial year of the great storyteller Hans Christian Andersen, they remind me of his story of the traveling salesmen and the emperor. Bush, Blair and company may not be emperors, but they are just as susceptible to flattery. 'What an opportunity! Only the most intelligent and far-sighted can admire this nuclear finery. Just one magnificent macho decision and it can all be yours. The ordinary taxpayer cannot see it at all. But you, sir, with your profound insight, are privileged indeed!'

I am wearily resigned to the likelihood that our leaders and their advisors are going to succumb to such blandishments all over again. I am also wearily resigned to the probable outcome. As in Andersen's story, when at length they propose to promenade in their nuclear splendor, I'd like to be there on the pavement with the little boy, pointing fingers and exclaiming 'There's nothing there!' I'd like think we'd all be laughing at their embarrassment. But I'm afraid that by then the consequences of their folly will not be funny.