



# Security Meltdown

by Amory Lovins

**Editor's Note:** Last week in Earthrise, Academy Fellow James Cusumano outlined his concerns about the nuclear industry.

*This week, Academy Fellow Amory Lovins notes the successful, though "desperate and last-ditch effort by the nuclear industry's remnants and advocates, to create enough illusion of revival to attract a huge new wave of public subsidies and government-funded orders before its remaining practitioners fade away." Curiously, many advocates of renewable fuels such as Greenpeace Co-founder Patrick Moore are advocating nuclear power in addition to wind and solar. The nuclear industry itself is using the same language: "We need a lot more electricity in this country in the decades ahead," said Steve Kerekes, a spokesman for the Nuclear Energy Institute, a trade group for nuclear utilities. "Nuclear (power) is not by itself the answer, but it's part of that diversity of (sources) that will fill the gap."*

*What is the truth?*

*Amory Lovins believes the prospects for nuclear resurgence -- as measured by its impacts on the environment, terrorism, global warming, economics, non-proliferation, petroleum independence, human rights --are categorically woeful, even catastrophic.*

*While nuclear advocates talk about their support for alternative fuels, he says they also depress the real economic current-day economic benefits of such sources. At the same time they exaggerate the upside of nuclear.*

*Read this typically provocative and thoroughly-documented essay and be your own judge.*

This is a greatly condensed and popularized summary of the nuclear section of "Energy Policy for National Insecurity," posted at [www.rmi.org/sitepages/pid171.php#E05-04](http://www.rmi.org/sitepages/pid171.php#E05-04), which provides details and documentation.



In recent months, the nuclear industry's remnants and advocates have been making a desperate last-ditch effort to create enough illusion of revival to attract a huge new wave of public subsidies and government-funded orders before its remaining practitioners fade away.



The U.S. Congress may soon accomplish an extraordinary feat: a national energy policy that undermines national security, substitutes hogs-at-the-trough market distortions for free markets, and is anti-life, anti-human-rights, and anti-federalist—all at the same time. Let's focus here just on the first part: how the energy bill that may soon become law would lastingly undermine the Pentagon's security mission.

This erosion takes three main forms: doubling and prolonging for decades U.S. dependence on the most vulnerable, concentrated, and hard-to-fix element of its oil infrastructure, the Trans-Alaska Pipeline System (TAPS)<sup>1</sup>; putting major terrorist targets along our coasts and near our cities; and greatly facilitating the proliferation of nuclear bombs. For brevity, we'll examine here only this last piece—nuclear energy.

Nuclear power, once claimed to be too cheap to meter, is now (said the *Economist* on 19 May 2001) too costly to matter. New nuclear plants deliver electricity at far higher cost than end-use efficiency, distributed cogeneration, and many renewables.<sup>2</sup> (Major studies like MIT's in 2003 examined only new central coal and gas plants, which cost more, emit more carbon, but still beat nuclear.) The market long ago figured this out, so nuclear salesmen scour the world for a single sale, invariably to a centrally planned power system, while competitors struggle to meet demand.

Nowhere do market-driven utilities buy or private investors finance new nuclear plants. None has ever been bid in a competitive power auction. Older U.S. and U.K. nukes resell at net prices too low to support building new ones. Japan's new power markets have already switched a third of big Tokyo office buildings from the nuclear utility to non-utility competitors, chiefly industrial cogenerators.

Nuclear power's market collapse should (but apparently doesn't) render moot its other unresolved issues, such as the manifest but officially denied vulnerability of nuclear plants—huge inventories of releasable radioactivity upwind of many cities—to simple but catastrophic terrorist attacks.

The nuclear industry's remnants and advocates deftly sidestep such problems, and emphasize low operating costs to distract from prohibitive capital costs. Now they're making a last-ditch effort to fabricate enough illusion of revival to elicit a tsunami of new public subsidies and taxpayer-funded orders before they perish. (Tellingly, they're not willing to risk their own capital.) This hoax has persuaded some people who should know better that nuclear



power is a realistic and indeed indispensable solution to climate change.

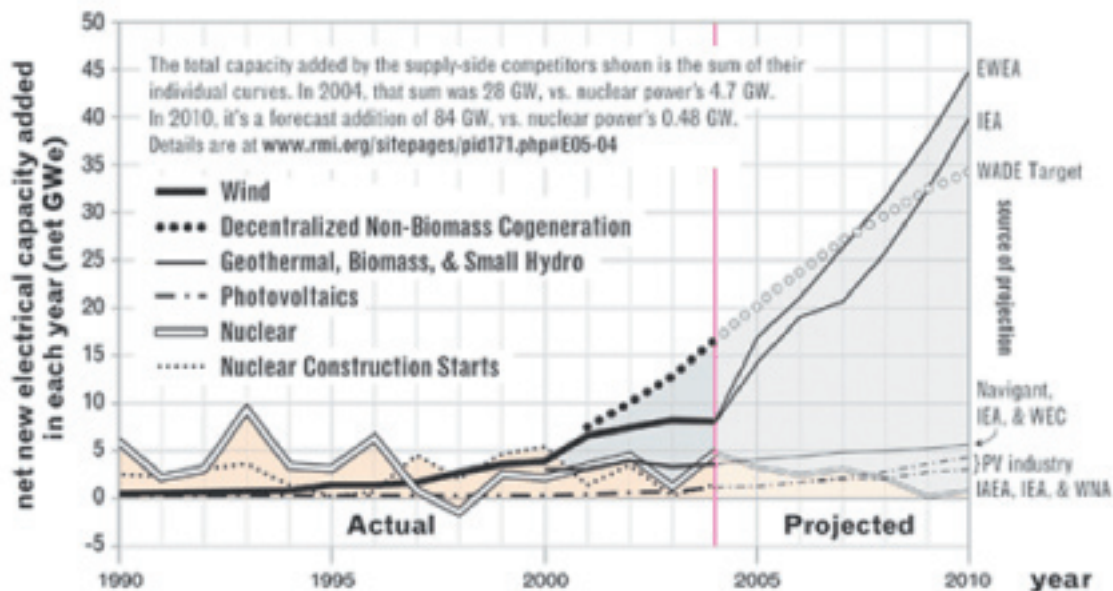
In February 2005, for example, a passionate *Wired* article by pronuclear journalist Spencer Reiss and former RMI Director Peter Schwartz, who led Royal Dutch/Shell's scenario planning and founded Global Business Network, claimed that efficiency and renewables, though nice and necessary, are grossly inadequate in size, speed, and certainty to meet the climate challenge, leaving "only one sane, practical alternative: nuclear power"—or as Stewart Brand put it in May 2005's *Technology Review*, "the only technology ready to fill the gap and stop the carbon dioxide loading of the atmosphere...."

No analysis underlies such assertions, and none could, because they're not true. Official speech after well-orchestrated op-ed continues to proclaim them, yet actual market behavior (see graph and [Competitors To Nuclear: Eat My Dust](#)) provides a devastating rebuttal.

### Gales of Change:

#### Global Annual Additions of Electrical Generating Capacity

In 2004, decentralized cogeneration and renewables, excluding big hydro dams (any over 10 megawatts), added 5.9 times as much worldwide net capacity as nuclear power added,



and raised annual electricity production 2.9 times as much as nuclear power did. By the end of 2004, these decentralized, non-nuclear competitors' global installed capacity totaled ~411 GW\*—12% more capacity than global nuclear plants' 366 GW—and produced ~92% as much electricity. Thus the "minor" alternative sources actually overtook nuclear's global capacity in 2003, rivaled its 2004 and will match its 2005 output, and should exceed its 2010 output by 43%. They already dwarf its annual growth. Official and industry forecasts indicate they'll add 177 times as much capacity in 2010 as dwindling nuclear power will. And

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they're dwarfed in turn by demand-side opportunities, not graphed here because reliable global implementation data aren't available. So the big question about nuclear "revival" isn't just who'd pay for such a turkey, but also...why bother? Why keep on distorting markets and biasing choices to divert scarce resources from the winners to the loser—a far slower, costlier, harder, and riskier niche product—and paying a premium to incur its many problems? Nuclear advocates try to reverse the burden of proof by claiming it's the portfolio of non-nuclear alternatives that has an unacceptably greater risk of non-adoption, but actual market behavior suggests otherwise.

\* About 266 GW (billion watts) of mostly gas-fired decentralized cogeneration (emitting ~30–80% less CO<sub>2</sub>, depending on fuel), 47 GW of wind, 47 small hydro, 37 biomass/waste, 10 geothermal, and 4 photovoltaics.

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Unfortunately, the debate isn't just about expanding the taxpayer bailout of a failed but still-powerful industry. Few understand that nuclear power has largely created, and its continued expansion would reinforce, President Bush's (and RMI's) prime national-security nightmare—nuclear proliferation. President Eisenhower's "Atoms for Peace" initiative has sown dragon's teeth by spreading worldwide the materials, skills, technologies, and other ingredients for do-it-yourself nuclear bomb kits. But above all, it's the innocent-looking civilian disguise that makes nuclear energy so reckless and proliferation so hard to stop. If a bomb made in North Korea or Iran or Pakistan ends up incinerating an American city, most likely it'll be thanks to the delayed side-effects of the nuclear power enterprise.

Power reactors themselves may not be the main direct source of bomb materials, though they could be:<sup>3</sup> they make materials suitable for reliable, powerful, and plentiful bombs (hundreds per 1-GW plant per year), don't arouse instant suspicion, and come with heavy subsidies from reactor vendors' governments. Rather, proliferators expertly exploit the giant loopholes that let bomb-builders get one screwdriver-turn away from completing a bomb without quite violating the Non-Proliferation Treaty (NPT). Proliferators can claim, as Iran does and North Korea has, to be enriching uranium or separating plutonium purely for the peaceful purpose of making electricity. Their vendors piously proclaim the same innocent intent.

The Treaty blesses such commerce in dual-purpose technology and materials "exclusively for peaceful purposes," but is purpose in the unknowable mind of the user or in the eye of the beholder? Now the U.S. House of Representatives has voted to revive plutonium extraction (reprocessing), halted by previous Republican Administrations because it's grossly uneconomic and greatly complicates waste disposal but is a dandy route to bombs. This encourages bomb-hungry countries with sparser energy resources.

Imagine, however, a world that took energy economics seriously. Cheaper alternatives to nuclear power would therefore be bought everywhere instead, as market economies do now (see [Competitors To Nuclear: Eat My Dust](#)). Nuclear commerce would finish its slow-motion collapse and enter an orderly terminal phase. Developing countries could take pride in adopting the modern, not the outmoded. All the ingredients needed to make bombs by any of the





20-odd known methods would cease being ordinary items of commerce. This would make them harder to get, more conspicuous to try to get, and politically far costlier to be caught trying to get because the reason for wanting them would be unambiguously military.

This wouldn't make proliferation impossible, but would make it far more difficult, for both recipients and providers. The smokescreen of civilian electricity production would be blown away, revealing any hidden bomb-making intent. Intelligence resources could be concentrated on needles, not haystacks. Anyone wanting the costliest source of electricity (nuclear) instead of least-market-cost options would have to explain why.

At the same time, existing nuclear states could get serious about their own NPT obligation to phase out nuclear weapons. (The contrary U.S. rush to develop new ones and scrap the Test Ban Treaty just scuttled the NPT Review Conference without plugging a single loophole.) The NPT's entitlement to nuclear technologies for exclusively peaceful purposes—a clause written by nuclear experts in 1965–68, when nuclear power was widely assumed to be cheap, safe, and essential—could be refocused on that bargain's ostensible purpose (affordable energy for development) by providing today's cheaper and nonviolent energy alternatives, such as efficiency and renewables. Had this market-driven path been adopted when we proposed it in the Summer 1980 *Foreign Affairs*,<sup>4</sup> today's proliferation crisis could have been avoided and the rapidly escalating risk of urban holocausts reduced. So why didn't it happen?

To be sure, a quarter-century ago, benign and carbon-free alternatives to nuclear power were far less mature, competitive, available, hence convincing. But the chief obstacle was and remains nuclear theology. This fervently held belief system asserts that nuclear power will become cost-effective if enough of it is bought; that its competitors, however laudable and successful, are and will always be inadequate; and that whatever it costs, and however unwilling the private capital market is to finance it, nuclear power must be bought anyway, because...well, just because.

This fixation makes the proliferation problem insoluble. It makes the nuclear waste problem politically insoluble too, because it implicitly expects host communities to accept not a limited but an open-ended quantity. It doesn't help with the oil problem.<sup>5</sup> And it worsens the climate problem, because every dollar spent on costly nuclear power instead of cheaper options buys less coal displacement. For example, if a new nuclear plant delivered a kWh for only three times the cost of saving a kWh (the actual difference is typically much larger), then for the cost of your one nuclear kWh, you could have saved three kWh, tripling your carbon reduction.

These realities have only strengthened since RMI first detailed them in the late 1980s.<sup>6</sup> Yet all were ignored then because they collided with dominant nuclear theology. Hence today's supposed Hobson's choice between frying slowly from climate change or instantly in a nuclear fireball—when in fact neither is necessary nor economic.

Peter Schwartz and a few other longtime friends have become so enchanted with nuclear theology that they now suggest, in a bizarre kind of reverse

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projection, that market-oriented analysts like RMI are somehow in thrall to quaint and impractical notions. They claim that we economic rationalists, not they, are misled by a false antinuclear theology that blinds us to the manifest superiority of the nuclear god.

Get a grip, guys. As a student of this subject since the early 1960s, when I thought nuclear power sounded like a good idea, I've always been, and am today, open-minded about the possibility that it may have hidden merits. But based on the literature and on deep practical experience of electric efficiency and production in scores of countries, I see no evidence that nuclear power, using any technology, under any political system (let alone an attractive one), is or promises to become an economically, technically, or socially sound energy solution.

I read many slick nuclear polemics and sweeping qualitative claims, but see no analysis backing up their key assertions, such as alternatives' being small and slow, which the market contradicts. It's no good claiming we need all options. We have only so much money. The more urgent you think it is to protect the climate, the more important it is to spend each dollar to best effect by choosing the fastest and cheapest options—those that will displace most carbon soonest.

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Amory B. Lovins is cofounder and CEO of RMI.

Thanks to the authors of two incisive analyses: Peter Bradford, *Nuclear Power's Prospects in the Power Markets of the 21st Century*, for the Nonproliferation Policy Education Center ([www.npec-web.org](http://www.npec-web.org)), and Doug Koplou, *NuSubsidies Nuclear Consortium* ([www.earthtrack.net/earthtrack/library/NNC\\_Overview.ppt](http://www.earthtrack.net/earthtrack/library/NNC_Overview.ppt)); to RMI colleagues Ken Davies, Nathan Glasgow, Kyle Datta, and Dr. Joel Swisher PE for research and review; and to Navigant Consulting and World Alliance for Decentralized Energy for data.

## FOOTNOTES

1 Spring 2001 RMI Solutions ( [www.rmi.org/sitepages/pid238.php](http://www.rmi.org/sitepages/pid238.php)) and annotated Foreign Affairs article ([www.rmi.org/sitepages/pid171.phpE01-04](http://www.rmi.org/sitepages/pid171.phpE01-04)).

2 See RMI Publ. #E05-04 (above) for details. The 207 "distributed benefits" detailed in RMI's *Economist* Book of the Year, *Small Is Profitable* ([www.smallisprofitable.org](http://www.smallisprofitable.org)), would disadvantage nuclear power by about another tenfold, but aren't counted here. The decentralized options are also improving quickest.

3 See my 28 Feb. 1980 *Nature* review article "Nuclear Power and Nuclear Bombs" (RMI Pub. #S80-1, [www.rmi.org/sitepages/pid618.php](http://www.rmi.org/sitepages/pid618.php)) and the Nonproliferation Education Center's 2005 paper, *A Fresh Examination of the Proliferation Dangers of Light Water Reactors*, [www.npec-web.org/projects/NPE-](http://www.npec-web.org/projects/NPE-)



[CLWRREPORTFINALII10-22-2004.pdf](#), by V. Gilinsky, H.W. Hubbard, & M. Miller.

4 *Nuclear Power and Nuclear Bombs*, RMI Pub. #S80-2 or [www.foreignaffairs.org/19800601faessay8147/amory-b-lovins-l-hunter-lovins-leonard-ross/nuclear-power-and-nuclear-bombs.html](http://www.foreignaffairs.org/19800601faessay8147/amory-b-lovins-l-hunter-lovins-leonard-ross/nuclear-power-and-nuclear-bombs.html), and three out-of-print books, notably *Energy/War: Breaking the Nuclear Link* (1979).

5 *Winning the Oil Endgame*, [www.oilendgame.com](http://www.oilendgame.com), pp. 98 and 258–260.

6 RMI Pubs. #E88-28, -29, -31, E89-2, -3, all at [www.rmi.org/sitepages/pid171.php#LibNucEnergy](http://www.rmi.org/sitepages/pid171.php#LibNucEnergy) or in hardcopy.

#### **About the author:**

**Amory Lovins** is a Fellow of the World Business Academy and chief executive officer of Rocky Mountain Institute. He is a consultant experimental physicist educated at Harvard and Oxford. He has received an Oxford MA (by virtue of being a don), nine honorary doctorates, a MacArthur Fellowship, the Heinz, Lindbergh, Right Livelihood ("Alternative Nobel"), World Technology, and TIME Hero for the Planet awards, the Happold Medal, and the Nissan, Shingo, Mitchell, and Onassis Prizes. His work focuses on transforming the hydrocarbon automobile, real estate, electricity, water, semiconductor, and several other sectors toward advanced resource productivity. He has briefed 18 heads of state, held several visiting academic chairs, authored or co-authored twenty-nine books and hundreds of papers, and consulted for scores of industries and governments worldwide. The *Wall Street Journal* named Mr. Lovins one of thirty-nine people worldwide "most likely to change the course of business in the '90s"; *Newsweek* has praised him as "one of the Western world's most influential energy thinkers;" and *Car* magazine ranked him the 22nd most powerful person in the global automotive industry.

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