



# On Proliferation, Climate, and Oil: Solving for Pattern

BY AMORY LOVINS | JANUARY 21, 2010

The problems of proliferation, climate change, and oil dependence share both a nuclear non-solution that confounds U.S. policy goals and a non-nuclear solution that achieves them.

The first four months of 2010 offer a unique opportunity to align the United States' foreign-policy goals with domestic energy policy and new market developments, and thereby to stem what the Pentagon's [Nuclear Posture Review](#) will reportedly rank equally with great-power threats -- the spread of nuclear weapons.

Epistemologist Gregory Bateson and farmer-poet Wendell Berry counseled "solving for pattern" -- harnessing hidden commonalities to resolve complex challenges without making more. President Obama's [speech](#) at the recent U.N. climate summit in Copenhagen hinted at such an approach by linking an efficient, clean-energy, climate-safe economy with three other key issues: prosperity, oil displacement, and national security. Keeping proliferation, climate, and oil in separate policy boxes has in the past stalled progress on the first two issues over North/South splits that the third issue intensifies. Yet these three problems share profitable solutions, and seem tough only because of a wrong economic assumption.

One false assumption can distort and defeat policies vital to paramount national interests. The Copenhagen climate conference proved again how pricing carbon and winning international collaboration are hard if policymakers *assume* climate protection is costly, focusing debate on cost, burden, and sacrifice.

That assumption is [backwards](#): Business experience proves climate protection is *not costly but profitable*, because saving fuel costs less than buying fuel. Changing the conversation to profits, jobs, and competitive advantage sweetens the politics, melting resistance faster than glaciers. Whether you care most about security, prosperity, or environment, and whatever you think about climate science, you'll favor exactly the same energy choices: focusing on outcomes, not motives, can forge broad consensus.

For instance, a January 2009 study by [McKinsey & Company](#) demonstrated how it was possible to cut projected 2030 global greenhouse-gas emissions by 70 percent at a trivial average cost: \$6 per metric ton of CO<sub>2</sub>. Newer technologies and [integrative design](#), which often makes very large energy savings cost *less* than small or no savings, turning diminishing into [expanding](#) returns, could make even bigger abatements cost less than zero dollars.

This can be done fast enough. Consider that from 1977 through 1985, U.S. oil intensity (barrels per real GDP dollar) fell 5.2 percent per year. Today, cutting global energy intensity at an annual rate of about 3-4 percent, *vs.* the historic 1 percent, could abate further climate damage. The United States has long achieved 2-4 percent cuts each year without paying attention; China achieved more than 5 percent reductions from 1976 through 2001 and is on track for 4 percent reductions from 2005 through 2010. Individual firms have been able to achieve 6-16 percent reductions. So why should 3-4 percent be hard, especially with most of the global economic growth in China and India, where making new infrastructure efficient is easier than fixing it later?

Since energy efficiency consistently makes money (billions for many firms), why should this be costly? And why should climate negotiators adopt economists' assumptions about cost rather than business leaders' experiences of profit? The climate conversation gets vastly easier and less necessary when it's shifted from shared sacrifice to informed self-interest.

Many policymakers likewise assume U.S. oil dependence and imports must be permanent. Yet a 2004 Pentagon-cosponsored independent [study](#) showed how it was possible to *eliminate* U.S. oil use by the 2040s at an average cost of about \$15 per barrel, led by business for profit. Implementation was launched in 2005 by "[institutional acupuncture](#)," then spurred by the 2008 price shock, 2009 policy shifts, and [military](#) innovation.

That effort now looks to be on or ahead of schedule: In 2009, "peak oil" emerged, but on the *demand* side. U.S. gasoline demand reached its [apex](#) in 2007. [Cambridge Energy Research Associates](#) doubts OECD oil demand will regain its 2005 peak. [Deutsche Bank](#) forecasts light-vehicle electrification (at one-third China's planned rate, and without counting the other revolutionary innovations underway) will turn *world* oil demand downward from 2016 -- reaching, by 2030, 8 percent below 2009. Suburban sprawl is reversing. Just in 2008, government-mandated "feebates" cut inefficient cars' sales in France 42 percent and raised efficient cars' sales 50 percent. Thus oil is becoming uncompetitive even at low prices before it becomes unavailable even at high prices.

Yet with oil as with climate, official assessments ignore these solutions as too detailed, disruptive, novel, or integrative to contemplate. When offered cramped old choices, policymakers all too often perpetuate largely incremental policies. Private firms are more likely to innovate, while governments play catch-up. And intergovernmental negotiations learn slowest of all.

Similar adherence to outmoded orthodoxies now cripples nonproliferation. Policy still rests on the fatally contradictory assumption that nuclear *power* is economical, necessary, and experiencing a revival. This makes the proliferation problem insoluble. Fortunately, that assumption is counterfactual -- and correcting it can make the proliferation problem largely soluble. Here's how.

In a 1980 *Foreign Affairs* [article](#), I first set out with two coauthors an economically based, logically consistent approach to nonproliferation. Eerily presaging today's conditions, the article said: For fundamental reasons ... nuclear power is not commercially viable, and questions of how to regulate an inexorably expanding world nuclear regime are moot....

The collapse of nuclear power in response to the discipline of the marketplace is to be welcomed, for nuclear power is both the main driving force behind proliferation and the least effective known way to displace oil: indeed, it *retards* oil displacement by the faster, cheaper and more attractive means which new developments in energy policy now make available to all countries. So far, nonproliferation policy has gotten the wrong answer by persistently asking the wrong questions, creating "a nuclear armed crowd" by assuming its inevitability. We shall argue instead that acknowledging and taking advantage of the nuclear collapse, as part of a pragmatic alternative program, can offer an internally consistent approach to nonproliferation, as well as a resolution to the bitter dispute over Article IV of the Non-Proliferation Treaty (NPT).

On the eve of the second NPT Review Conference, to be held in Geneva in August 1980, fatalism is becoming fashionable as the headlines show proliferation slipping rapidly out of control. Yet...an effective nonproliferation policy, though impossible with continued commitments to nuclear power, may become possible without it -- if only we ask the right questions.

Thirty years later, as the eighth NPT Review Conference prepares to convene in Vienna on April 30, 2010, just one word needs updating: now that *oil* generates less than 6 percent of the world's electricity, today's nuclear expansion is meant instead to displace *coal* to protect climate.

That rationale is identically unsound. In principle, quadrupling today's global nuclear power capacity -- to replace, then triple, retiring units -- could provide up to one-tenth of needed carbon reductions. But nuclear power is the [least effective](#) method: using it does save carbon, but about 2-20 times less per dollar and 20-40 times less per year than buying its winning competitors (mentioned below). Nuclear expansion would thus reduce and retard climate protection. We must invest judiciously, not indiscriminately, to get the most climate solution per dollar and per year. Expanding nuclear power does the opposite.

The 1980 article's logic remains sound:

- We can have proliferation with nuclear power, via either end of any fuel cycle: "*every form of every fissionable material in every nuclear fuel cycle can be used to make military bombs, either on its own or in combination with other ingredients made widely available by nuclear power.*"
- We can't have nuclear power without proliferation, because its vast flows of materials, equipment, skills, knowledge, and skilled people create do-it-yourself bomb kits wrapped in innocent-looking civilian disguise. Safeguards to prevent that misuse "cannot succeed either in principle or in practice," because national rivalries, subnational instabilities, and human frailties trump treaties and policing.
- We can have proliferation without nuclear power -- but needn't if we do it right: with unimportant exceptions, "*every known civilian route to bombs involves either nuclear power or materials and technologies whose possession, indeed whose existence in commerce, is a direct and essential consequence of nuclear fission power.*"
- Crucially, in a world *without* nuclear power, the ingredients needed to make bombs by any known method would no longer be ordinary items of commerce. They'd become harder to get, more conspicuous to try to get, and politically costlier to be caught trying to get (or supply), because their purpose would be *unambiguously* military. This disambiguation would make proliferation not impossible but far harder -- and easier to detect timely, because intelligence resources could focus on needles, not haystacks. Thus phasing out nuclear power is a necessary and nearly sufficient condition for nonproliferation.

The American Academy of Arts and Sciences' 2009 nuclear [study](#), confident of nuclear power's necessity and viability, ignored its decades-long [collapse](#) in market economies due to unsupportable economic costs and financial risks. That study simply overlooked the [data](#): shrinking global nuclear output, less than 5 percent nuclear share of capacity under construction, retirements outpacing additions for decades to come, every plant under construction bought by central planners (none by conventional free-market transactions), and zero equity investment despite extremely generous new subsidies in the United States, roughly [equivalent](#) to or greater than construction cost.

The fact is, nuclear investment has no business case: With or without a price on carbon, nuclear power *and* big fossil-fueled power plants simply cost far more than "micropower" generation (renewables except big hydropower, plus cogenerating electricity with useful heat) or saving electricity through efficient use. [Micropower](#) has surpassed nuclear output since 2006, when it produced one-sixth of global electricity, one-third of new electricity, and 16-52 percent of all electricity in a dozen industrial countries.

In 2007 alone, the United States added more megawatts of wind power than it added in coal generation from 2003 through 2007, or than the world added nuclear power in 2007. And in 2008, renewables attracted more global investment than fossil-fueled generation; distributed renewables added 40 billion watts and got \$100 billion of private investment while nuclear added and got zero. In each year since 2005, nuclear power has added only a few percent as much output as micropower, and since 2008, less than photovoltaics.

No policy can change this: even France's uniquely dirigiste 1970-2000 nuclear program suffered 3.5-fold capital escalation, nearly doubled construction time, and acute [strains](#). "[New](#)" [reactor types](#) aren't materially different, though they often pose more proliferation danger. Even more today than when I wrote in 1980, nuclear power's "risks, including proliferation, are ... not a minor counterweight to enormous advantages but rather a gratuitous supplement to enormous disadvantages."

Today, these market realities present a brief opportunity to align U.S. nonproliferation policy with the Obama administration's emphasis on efficient energy use and renewable, distributed sources.

If a country with America's wealth, infrastructure, skills, and fuels claims it needs more nuclear power, all countries gain a strong excuse to follow suit. But U.S. acknowledgement of the market verdict favoring non-nuclear alternatives would encourage less richly endowed countries to seek profit and prestige from similar modernity. Aligning America's energy words, deeds, and offers would transform her journey beyond fossil fuels from a seeming plot to choke global development into routine, rational, replicable pursuit of least cost, green jobs, and industrial renewal.

Nobody need be antinuclear. The issue, just as I framed it in 1980, "is not whether to maintain a thriving [nuclear] enterprise, but rather whether to accept the verdict of the very calculations on which free market economies rely." Making nuclear power compete on a level playing field, after 56 years of enormous subsidies, would be a good start. De-subsidizing all energy across the board would be an even sounder approach.

Since Washington proposes nuclear fuel security initiatives, why not broader energy security initiatives? What if the Obama administration announced it would help spread the best buys it's adopting -- efficiency, renewables, distributed energy systems -- to all desirous developing countries, unconditionally and nondiscriminatorily? Most such countries are renewable-rich, but infrastructure-poor. They could welcome "Sunbeams for Peace" for the same hard-nosed reasons that made China the world leader in five renewable technologies, with energy efficiency its top strategic priority -- not forced by treaty, but informed by Premier Wen Jiabao's and his fellow-leaders' understanding that otherwise Beijing can't afford to develop. Perhaps the United States, which invented many of these technologies, could even try to reclaim part of the burgeoning market it abandoned to China, Japan, and Europe.

Attendees at the upcoming NPT Review Conference are expected to clash on implementation of two main points in the original treaty: weapons states' underfulfilled obligation under Article VI to pursue nuclear disarmament, and developing-country signatories' right under Article IV to access nuclear technology for exclusively peaceful purposes.

Progress in and beyond the new round of Strategic Arms Reduction Treaty talks between the United States and Russia should help on Article VI; policy shifts building on Obama's Nobel Peace Prize speech can help too. But progress on Article IV depends on recognizing one simple yet unnoticed fact. When the NPT was drafted in 1958-68, nuclear power was widely expected to be cheap, easy, abundant, and indispensable.

Non-weapons states' reward for forgoing nuclear weapons was therefore *framed as* access to nuclear power -- but only, as I explained in 1980: ... because of the nuclear context and background of the negotiators, not as an expression of the essential purpose of Article IV. ... The time is therefore ripe to reformulate the bargain in the light of new knowledge. Instead of denying or hedging their obligations, the exporting nations should fulfill it -- in a wider sense based on a pragmatic reassessment of what recipients say their real interests are.

Having adjured bombs, recipients want reliable and affordable energy for development. The past half-century has revealed manifestly cheaper, faster, surer, more flexible methods than nuclear power, so now, just as I put it in 1980, "recipients should insist on aid in meeting their declared central need: not nuclear power *per se* but rather *oil [and now coal] displacement and energy security.*"

Reinterpreting Article IV in light of a half century of energy experience can isolate legitimate from illegitimate motives and help smoke out proliferators, advancing the treaty's central goal. Let countries that still want specifically *nuclear* energy, rather than cheaper and more suitable options, explain why.

Now let's solve for pattern. The help developing countries expect under NPT Article IV is exactly the same help they sought in Copenhagen to get off fossil fuels, and the same help many also want to escape oil dependence. President Obama's Copenhagen pledge of climate mitigation aid must now echo in Vienna's

NPT context. That linkage would attain many big policy goals for the price of one, and remove the contradiction undermining the NPT.

Launching this new energy conversation in Vienna is America's best opportunity to inhibit the spread of nuclear bombs *and* start breaking the Copenhagen political logjam on climate justice.

At home, proposals to expand nuclear subsidies -- whether to buy Senate climate-bill votes, or motivated by a sincere but mistaken belief that nuclear expansion will help protect climate -- will amount to lose-lose scenarios; that approach will only prop up a failed climate non-solution that also makes proliferation unstoppable and weakens American values of free markets and a free society.

Yet applying internationally the sound *non*-nuclear elements of current domestic energy policy could profitably and simultaneously help solve the proliferation, climate, and oil problems. It would reinforce global development, transparency, democracy, women's advancement, energy resilience, and economic and political stability. It makes sense. It makes money. It would expose and discomfit only those who lack competitive offerings or harbor ulterior motives.

The surest path to a richer, fairer, cooler, safer world -- where energy insecurity, oil, climate change, most proliferation, and many development problems fade away -- would be a U.S. energy policy that takes economics seriously. It would let all ways to save or produce energy compete fairly, at honest prices, regardless of their type, technology, location, size, or ownership. Who's not in favor of that? Why don't we find out? And why can't such a least-cost domestic energy strategy inform, integrate, and inspire foreign policy too?

---

Amory B. Lovins is cofounder, chairman, and chief scientist of Rocky Mountain Institute and an advisor to industry and governments worldwide. An expanded and annotated version of this paper is posted at [www.rmi.org/rmi/Library/Prolif+Oil+Climate+Solving+Pattern](http://www.rmi.org/rmi/Library/Prolif+Oil+Climate+Solving+Pattern).