

Rocky Mountain Institute



THE POLICY OF ENERGY CHANGE

A conversation between RMI Chief Scientist Amory Lovins
and Denver Mayor Hickenlooper

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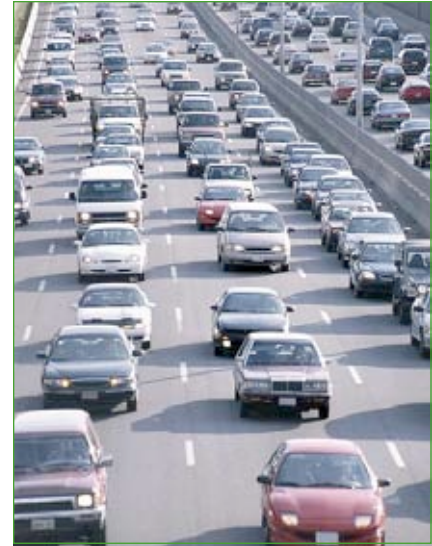
Denver Mayor John Hickenlooper and RMI Chief Scientist and Co-founder Amory Lovins discuss energy policy including how to design walkable cities, how to drill for efficiency, and what governments can do to accelerate the clean energy revolution.

Mayor John Hickenlooper: What should municipal governments be doing to promote energy efficiency to the levels necessary to ward off future impacts of climate change? What advice would you give to a group of mayors around this issue?

Amory Lovins: Most of the action in energy, environment, and climate policy is actually at a state and local level, not at a national level. So that's really where the action is. And these governments can also influence other levels. For example, if the mayor of a city in Colorado goes to the public utility commission, that'd probably get some attention. Especially if you were arm in arm with the utilities, environmental communities, and military while asking that utilities get rewarded for cutting your bill, not for selling more energy. Mayors have a mea culpa and platform of leadership to do the cheapest thing first. So all municipal facilities ought to be really efficient whether new or retrofit.

When this happens, what people will see every time they come into city hall is going to be a lesson for whatever else they do. For example, I bet a lot of business people in Denver don't realize they can get 6 to 16 percent higher productivity in efficient offices or about 40 percent higher sales in day-lit stores. You get higher economic vitality when you take into account people are happier, healthier, and more productive in efficient buildings.

There are a lot of parts of municipal infrastructure we don't think about. Water and treatment plants have enormous savings potential. And when you save the money it ought to get plowed into more such projects. Do what the state of Washington used to do: if somebody does something smart to save money, in energy or otherwise, they get rewarded for part of the saving, so does their organization, so does the general treasury (money flows back to city council or state legislature so they realize it's a good idea). And then you use some of the savings as a kitty from which you can finance longer payback measures without going back to the capital budget. So it arouses the entrepreneurship within the sponsoring organization.



There are a lot of city rules. Two examples come to mind. San Jose had the bright idea that rather than requiring developers to have two parking spaces for an apartment or condo, they would prohibit providing parking for a condo or apartment but require instead annuitizing a perpetual public transportation pass. The developers liked that idea because it was about 10 times cheaper and people could get parking in the private market. One of the ways you could do that is to allow people who have street parking outside the house they own to rent it during the day.

Or in Stockholm they almost passed a really interesting ordinance: if you want to be allowed to drive downtown during a given month you have to buy a permit for your windshield. But it's also portable and is a pass for the entire public transport system. So if you bought it, you might as well use it.

We really have to get to a county and municipal level to start de-mandating and de-subsidizing sprawl. Also we need to look hard at zoning so we don't mandate separation and dispersion but rather cluster everything within a 5 minutes walk of where you want to be. This would be a lasting contribution.

Let me ask you, what kinds of policies are you making that you could make differently? What are the challenges you're facing?

Hickenlooper: We are doing a lot, as evidenced by the light rail train you hear right now. We currently have four light rail lines. In 2004 we embarked to develop 119 miles of new track. We plan to have this track run to the suburbs and through brownfields. We'd like each stop to be located in previous industrial sites and use them as a nucleus for re-development. The dream is that we have at every old industrial site in addition to a train station, a small village with 6–8 ten story buildings, affordable housing, and increased density. I really like the notion of annuitizing a light rail pass instead of requiring parking space downtown. We built 25,000 downtown housing units and used every incentive we could to optimize for density. Because once you reach a certain density, everything else tends to follow.

Lovins: Maybe you could try what Santa Barbara invented--and it costs you nothing--let any green project go to the front of the queue.

Hickenlooper: We have discussed that and are weighing the political consequences... but we're certainly moving in that direction.

Over the course of our lives we've experienced several different rises in energy prices. Particularly memorable for many of us was the rise in the 1970s. In what ways is the current rise in energy prices different?

Lovins: The oil price went a little higher in real terms (this time around). What happened last time is actually quite interesting. If you look at real price versus

world oil use, prices went up in '73 , then prices grew slowly, then they went up even more, then when demand shrunk prices did a loop to loop. Prices fluctuated with other miscellaneous events, like wars. Now we're starting to do another loop to loop. That's what commodities do. Oil prices have been perfectly random for 140 years, why stop now? You have to get used to it and arrange your affairs so you don't care what energy prices are.

Now a funny thing happened in the U.S. in the mid 1980s. It was about 5 or 6 years in taking shape. When President Reagan came in 1981 he believed we needed lots more supply and expensive kinds: coal and nuclear power plants and frontier hydrocarbons. So he really greased the regulatory skids and put in huge subsidies to get things built that wouldn't have been built in the private market. And a lot of those things started to get built. Meanwhile, however, under the dual influence of the remaining Carter-era efficiency policies, like CAFÉ standards, and the price shock of '79, the market was quietly and unnoticeably producing a gusher of efficiency. So you had these two trains rushing down the track in opposite directions: supply more and use less. And they met with an awful noise in about '83 to '85 and that train wreck produced flooded markets, crashed prices, and bankrupted suppliers. The basic dynamic was efficiency turned out to be a really fast investment. It could get built sooner than the cadre of supply side stuff so it got to the customers first and grabbed the revenue. And then the suppliers didn't have enough demand or revenue to service their debt. There's still a lot of scar tissue among Wall Street old timers on that one.

Well, twenty years later we have an exact repeat. Another new president comes in who has the same belief system. It takes a few years for him to get all his subsidies through congress, but they're even bigger. For example the subsidy on a new nuclear plant now probably exceeds its total cost-- although there are still no private investors to be found and even less after recent events. Now the cause of the Efficiency Revolution this time is different. This time it's not driven by federal policy, on the contrary its driven more by state policy and some municipal policy and a lot of smart private sector choices and general concerns about climate and security. And of course in the last year or two by another price shock. So that very much reinforced it. But just over the past decade, before that last price shock and while we were happy with low prices, over $\frac{3}{4}$ of energy services were actually provided by reduced energy intensity not increased physical supply. So if you just read the normal statistics about supply, you might miss what $\frac{3}{4}$ of the energy market is doing, just like Reagan missed it. So we have those two trains now about to collide again. And it could be the same story all over again. The difference this time is even if prices crash, which fundamentals would suggest over the coming years, we'll still keep our eye on the ball because of climate concerns and security concerns. And any one of those three concerns: energy prices, climate, or security will bring us to do the same thing, namely use energy much more efficiently and get it from distributed, diversified, benign, renewable, and resilient sources.

Hickenlooper: Having spent most of your career talking about using existing resources better or renewable sources, when you watched the recent republican convention chant, "drill baby drill," what was your response?

Lovins: I think it's a wonderful slogan... they're just planning on drilling in all the wrong places. My wildcatters have recently been busy looking for oil and they found about 8 million barrels a day in the Detroit formation and about a million barrels a day in the Seattle formation. All together we found 14 million nega-barrels (saved barrels) at about \$12 bucks a barrel. And we know exactly where it is and it's domestic, climate safe, and it won't run out. We also found about 12 trillion cubic feet a year of gas at under a dollar per thousand cubic feet. What that amounts to is you can save about half the oil and gas in this country at about an eighth of its price.

If you're drilling physically for physical hydrocarbons and you go to the ends of the earth to drill very expensive oil and gas that might not even be there while somebody else finds all that cheap oil under Detroit wouldn't you feel embarrassed or possibly bankrupt? I think the obvious lesson is we ought to drill in the most prospective places first and they're obviously on the demand side. This somehow tends to get missed in the political discussion.

I think actually even if we are foolish enough to try and drill in many of the places suggested, little or none of it will happen because it's grossly uneconomic. The cost of drilling in deep water or the arctic has risen faster than the oil price. And many of these prospects were unattractive at the old oil prices and are unattractive at the new oil prices because the cost has risen more. The technology improvements tend to advantage the cheaper, less technically risky resources more. Even at the old oil prices the oil majors were not in the least interested in drilling in the arctic national wildlife refuge because it had about the worst risk/reward ratio of any of their global prospects portfolio. And since then a lot of things have gotten worse including that it was doubtful before and its much more doubtful now that there's enough water or winter to build their ice roads. It may not even be technically feasible by now because of global weirding.

Of course the real show stopper for the arctic refuge is national security. And Jim Woolsey, the normally oil-friendly Oklahoman who used to lead the CIA, has testified in the house against drilling in the arctic refuge for this very reason. This is because the oil can only come south through the trans-Alaskan pipeline, the most vulnerable element of our national energy infrastructure. It's about 800 miles, mostly above ground, and mostly accessible by road. It has been shut down by accidents a number of times. They blew up a pumping station by accident once. It has been incompetently bombed twice, shot at over 50 times, punctured once, and shut down by a drunk with a rifle. And the scariest one to me was the disgruntled engineer who, to make money in the oil futures market, had a very well-developed plot almost ready to execute to bomb three critical points with 14 cold-weather tested bombs he'd made. Except he happened to

enlist an ex-seal to help him and the guy turned him in so he was caught by accident. But if you shut down that pipeline for a week or two in mid- winter, you can't start it again because there's nine million barrels of oil turned into the world's largest chap stick, it just congeals into wax. So the notion that this should be the centerpiece of our national energy supply is just like putting a kick-me sign on Uncle Sam's back side. It seems a really dumb idea especially to do it in the name of energy security. And it's odd that those who say they are most in favor of national security should propose such a thing.

Hickenlooper: Let's talk about funding for clean energy and efficiency. Do you think research development in this field is better handled through government funding or through private funding?

Lovins: A mixture of both. Governments are generally not good at picking winners. The private sector may have sharper pencils in that department but unfortunately R&D investment from both has dropped several-fold in energy over the past decade or two. It's now at derisory levels. The total R&D investment as of a few years ago was less than the R&D budget of a single big biotech company, like Genentech. So this is one of our most pressing national problems. We're clearly under-investing in solutions and it's quite amazing how well we're doing none the less. But there is a lot more to be done and I would like R&D actually to focus on things that have some prospect of success rather than simply being welfare programs for unemployed technologists who have something technologically sweet that really ought to stay in the lab because if it succeeded it wouldn't be of any use. For example nuclear fusion is believed by everybody I know who's looked at it to cost at least as much as nuclear fission, which is so grossly uneconomic that it has about a 1 to 2 percent market share of new capacity and no private investors in the world. Or suppose you want to do research in a new kind of nuclear reactor. Fusion is just a different way to boil water to turn a turbine to produce electricity. It turns out that the part of the nuclear power station that boils water is quite a small fraction of the total cost. So even if it were free and you just had to build the rest of the plant the turbine and the heat sink and the generator and all that stuff it would still be grossly uncompetitive and would still get walloped in the market and pushed out by efficiency and micro-power, which is what's happening now.

Hickenlooper: Carbon pricing. We've all been watching the federal government on this one. What is the best economic model for putting a price on carbon? Is it a carbon trade or carbon tax? What's your perspective on the economic and political fairness of either option? What would have the least turbulence being passed?

Lovins: Politically it might be easier to do cap and trade instead of a carbon tax. If they're both done really judiciously they'll lead to the same place but with different uncertainties. A tax let's you know exactly what the price of carbon emission is going to be, but you don't know how much carbon you're going to

avoid by putting it in place because you don't know the exact price elasticity. With cap and trade you know what is the maximum you're going to emit, that's the cap. But you don't know how the market's going to price it. You have to figure out politically which uncertainty you'd rather have. The main difficulty with either one, as usual, is in the fine print, which is politically determined. And my main fear is either one, but particularly the cap and trade, will be set up with too many allocations as the regional project in the Northeast seems to be set to do. That crashes the price and slows everything down by several years, as they just did in Europe. Or it will be set up to reward incumbent monopolists and monopsonists by giving them a free pass on what they're already emitting while any marginal emitter like any new market entrant would have to pay. But that's simply a barrier to competition, and a bad idea. If anyone is going to emit, new or old, they should all have to pay because the carbon's all the same regardless of who emits it.

But carbon pricing is a good idea and we should do it. Putting carbon in the air should not be free any more. But, just as a note of caution, we already have in place today the equivalent of about \$150 a ton or more carbon tax from oil prices. This is three times the level the president was afraid would wreck the economy. The only difference is we send the money to OPEC instead of to ourselves. And in the long run, I think, pricing carbon will not be either essential or certainly sufficient. It's not essential because you can still get huge returns even at the old energy prices. It is not sufficient because if you have the right price and don't bust barriers people can't respond intelligently to price and not much happens. DuPont found its European chemical plants were just as inefficient as its US plants even though in Europe they have to pay twice the energy price. That's just because they're all designed the same way with the same equipment and processes and there ain't much room for behavioral change in a chemical plant. Carbon pricing also will probably not be a very big number in the long run because there's so much cheap efficiency out there that an efficient market will ultimately clear it at quite low prices. Yeah, we should do it, but it's not a panacea. The efficiency cornucopia is a manual model. You actually have to turn the crank. And that's about a whole lot more barrier-busting than just getting the prices right.

Hickenlooper: I want to ask some questions regarding the psychology of Change. When we had the democratic convention a couple weeks ago, Denver embarked on the largest transit expansion in Amtrak's history. During the convention, we had a bike-sharing program for convention attendees and residents, which was a huge hit. So now we're in the planning stages of an urban bicycle transit system that's integrated throughout the city. But at the end of the day, it still comes down to change on the individual level. So what suggestions would you have for a municipality like Denver to motivate people to change out of cars and to alternative transportation?

Lovins: You make the alternatives more attractive or less unattractive. Like making sure there are good bike lanes so you won't get killed when you ride your bike.

Hickenlooper: Many bicyclists are complaining about too much traffic.

Lovins: I bet. Bike lanes are also getting congested. Time to make them bigger.

Also, drivers should pay for what they get. Singapore does that. They pretty much internalize the full social cost of driving instead of socializing most of it to everybody else. The result is that they have essentially no congestion even though they have a more prosperous capital than Bangkok, which has such dreadful congestion that people will set up offices and bathrooms and so on in their vehicles. They have to because they'll be stuck in traffic for hours. A sixth of the whole GDP of Thailand vanishes in traffic jams. So look at the difference, it's just one of policy. If you have free enterprise for everything else and corporate socialism for cars and especially if you have over provision of parking and roads as apparently free goods, you will have way too many cars. But if you design your city around people rather than cars, they'll be a lot more livable. And that takes decades to work through, but I think you're starting to go in that good direction. Of course, cars will get much more efficient and clean, but that just means that if we still have too many people driving them too many miles, instead of running out of air, oil, and climate, we will run out of road, land, and patience.

I wonder if one could imagine an emergent coalition between all of the elements of the immobilized class, somewhere between 1/3 and 1/2 of Americans who are either too old, young, poor, or infirm to drive, yet pay most of the costs of other people driving. One can imagine advocacy groups for the elderly, impoverished, handicapped, and so on saying, "Why should we pay for their driving? We can't drive. Let drivers pay their own costs."

Remember that conspiracy of which GM and Goodyear and a few others were convicted for buying up and shutting down the public transit system- the redline- in LA? What they were trying to do was to make a market for buses. But let's go back even further, when the car was being invented and developed in the U.S., the emergent automakers never dreamed they'd be able to get the roads for free. They thought they'd have to pay for it just like if you built a railroad. So the push was to develop and sell buses. And then suddenly you had the free roads, except they weren't really free because there's either user supported roads or tax-payer supported roads. Which kind do you want? That frames the choice much more clearly.

Hickenlooper: I wanted to ask you about the idea of making roads white.

Lovins: Instead of roads, let's talk about parking lots. Most parking lots are black or dark gray, so they're boiling hot in the summer, you get out of your car and

your faced with this wall of heat and then when you leave your car there while you're in the air conditioned store, the car gets really hot. So it takes a whole lot of air-conditioning energy and pollution to get a car cold again and you have an air conditioner big enough for a house in Atlanta.

Also, the hot air surrounds the store and uses more energy in air condition, puts up cost, and reduces comfort. Now, if you use a light-colored surface, using materials like limestone, white sand, crushed oyster shells, or anything with white in it, it costs about the same as dark asphalt, but it stays a lot cooler, it lasts longer because it doesn't overheat and you don't have so much daily expansion and contraction from the heat cycle. And there's an unexpected benefit for the retailer operator. I'm aware of this because we've worked with Wal-mart among others. If you make the parking lot a light color, the light bounces around so much better that with new, extremely efficient fixtures (that also don't spoil the night sky) you can see very well with almost no light. So you have much better safety and security and you're not dazzled so you win on all counts. You also want to make a permeable parking lot that soaks up the water so you save investments in stormwater infrastructure.

Hickenlooper: If you were appointed energy czar by the next administration, what would be your first task?

Lovins: A conversation about being the secretary of energy did start to happen many years ago and I said I would consider it if I could blow up the department and start over. What I meant specifically by that is the Department of Energy spends most of its budget and effort on cleaning up nuclear waste and nuclear weapons. Neither of which belongs in the department of energy; they're there for historic accidental reasons. So my first act would be to get those out of the department into other civilian agencies so I could have a civilian energy department. And by the way, I want to make energy policy, I don't want somebody in the white house making it for me.

And then my policy framework would be arrestingly simple and trans-ideological. I would let all ways to produce or save energy compete fairly at honest prices regardless of which kind they are, what technology they use, how big they are, where they are, or who owns them, and let's see who's not in favor of that. It will of course be all the corporate socialists who are very comfortable with present arrangements they've made a lot of money to get. We have the best government money can buy.

Hickenlooper: You briefed the Pentagon on security issues related to our electric grid, could you summarize some of those issues and where we stand today?

Lovins: A recent report by the Defense Science Board Taskforce Council titled, "More fight less fuel," actually puts the Pentagon in the nice position of leading

our government in getting our country off oil (so we don't need to fight over the oil). It focuses on two main concerns, the one I won't address here is the inefficiency of military platforms that use fuel with enormous costs in blood and treasure. And the good news is we got the Pentagon to value fuel much more than they did previously when they used to assume that delivering fuel is free and invulnerable. And this will drive a new amount of competition in providing more efficient platforms and that will spark innovation that goes back to the civilian car, truck, and plane industries and triples those vehicles efficiencies faster and gets us off oil sooner.

But the part I want to emphasize is the other part of the report on electricity. We found there are such serious physical and cyber vulnerabilities in the grid, some previously unsuspected, that the military cannot rely on the grid as it now does almost entirely for its mission continuity. The report therefore recommends all 585 US bases and those abroad should basically get off the grid. They should make their own power that is reliable with or without the grid and create knitted microgrids that run on base resources, preferably renewable. It turned out that in about 95 percent of cases you can do that and it will often save money as well. And the bases could power themselves and surrounding communities even if the grid goes down for years and we're back in the seventh century.