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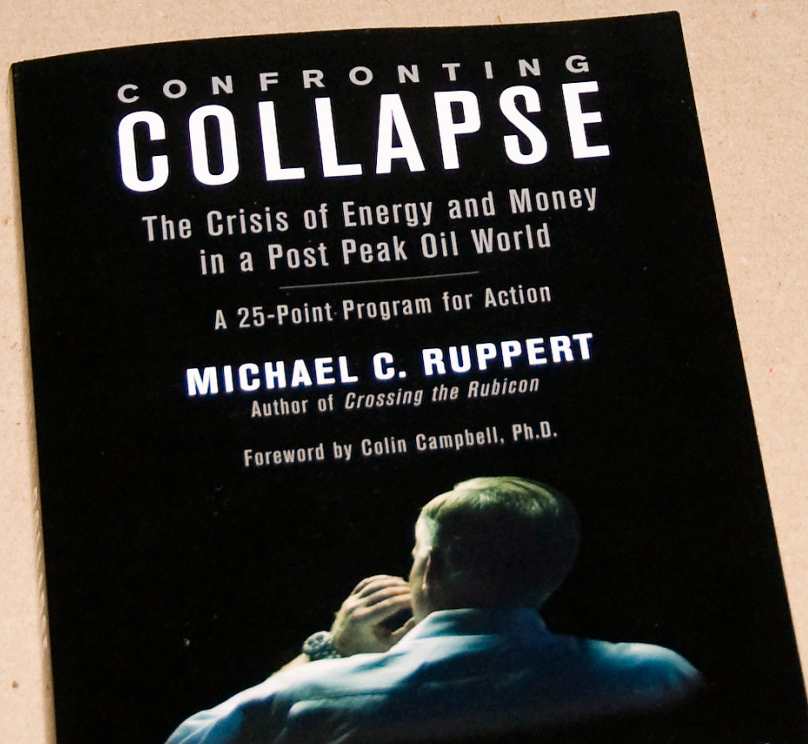
THE GRID

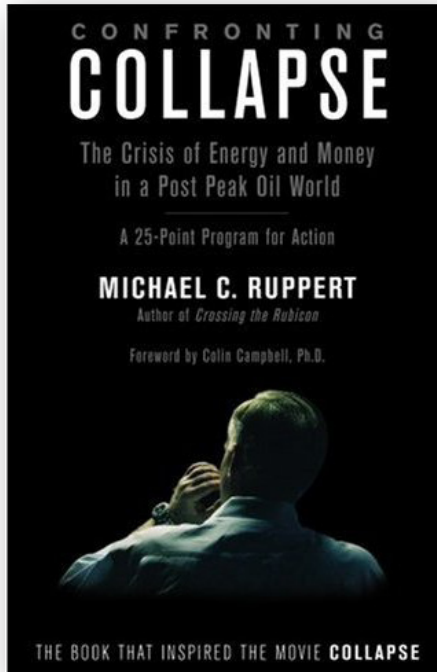
An excerpt from

CONFRONTING COLLAPSE

The Crisis of Energy and Money
in a Post Peak Oil World

MICHAEL C. RUPPERT





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THE BOOK

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The Crisis of Energy and Money
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There are two basic kinds of infrastructure that every nation must be concerned with. The first is energy infrastructure which is both a national and a global issue for America. Historically, a substantial part of the global investment in oil and gas that took place over seven or eight decades came from either U.S.-based companies or the U.S. government itself. The second kind of infrastructure is everything that keeps things running inside the United States: bridges, dams, sewers, roads, water supplies, and perhaps most important of all, the electric grid. Some of this domestic load is carried by the federal government, but the majority of it has traditionally been carried by state and local governments, or by public utility companies which are already breaking down (or up) for many reasons.

Take away five million or five billion dollars to buy more expensive energy for everything from school buses, garbage trucks, police cars, and ambulances to power generation and there is that much less to repair roads, sewers, and everything else we rely on, especially the grid. Take away more billions from shrinking



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property tax revenues and failing banks and the problems start compounding as the squeeze hits from both ends.

Our state and local governments are so broke that they have begun selling off public assets like toll roads and bridges because they can't afford to maintain them anymore. The ongoing economic collapse hasn't changed a thing. Now there is less money because tax bases are collapsing. Many state and local governments are – in the face of a just-beginning collapse – starting a sequential shut-down process.

Oil And Gas Infrastructure

On April 21, 2008, Nobu Tanaka, executive director of the International Energy Agency, gave the keynote address to the 11th International Energy Forum in Rome. In that speech he said:

Investment is one of the main challenges we are facing in the global energy sector . . . USD 22 trillion in investment will be needed in energy-supply infrastructure by 2030. The oil sector alone needs USD 5.4 trillion. Although

spending has recently increased, supply growth could remain sluggish, because of increasing costs and a proliferation of above-ground risks, such as more frequent access limitations and tighter fiscal and regulatory regimes.

Twenty-two trillion (with a “T”) dollars? Where is that money going to come from? The printing presses are running out of ink and ink is expensive. Do we just keep printing it? Money is needed not for investment in renewable energies and new technologies; it is needed to keep an aging oil and gas infrastructure status quo operational; to rebuild or fix pipelines, refineries, and rusty drilling rigs. It is needed to construct new offshore rigs that must be built before stop-gap, unproven, and limited deepwater oil fields can be found and tapped. Remember that drilling a hole, which can be very expensive (especially in deepwater fields in the Gulf of Mexico or the Arctic), does not guarantee that oil will be there.

Investment is needed to rebuild damaged or neglected upstream oil and gas infrastructure, most critically in Iraq, which has been devastated by two major wars, a decade of UN sanctions, and internal sabotage and where the second-largest oil reserves on the planet are still on the upside of Peak.

Deepwater drilling rigs are important to the United States as it debates whether to allow new offshore drilling in formerly prohibited areas or to tap accessible fields and leases (that might hold oil) in the Gulf of Mexico and other regions. These rigs are very expensive and, as of the summer of 2008, there were virtually none available. The economic crash has limited the amount of credit and financing necessary to underwrite capital investment costs for rig building, which can



The [oil] rigs themselves take years to build before drilling can even begin. The ones that have already been built are in use and – in what will come as a surprise to most – a large portion of them have already been leased by Saudi Arabia

only be recovered if there’s oil flowing at the end of the day. The rigs themselves take years to build before drilling can even begin. The ones that have already been built are in use and – in what will come as a surprise to most – a large portion of them have already been leased by Saudi Arabia. That’s right, Saudi Arabia.

The *Houston Chronicle* reported on May 2, 2006 that “by year-end, Saudi Arabia will have 120 [offshore] rigs operating in the country, up from 85 last year and 54 in 2004.” That is a 120% increase in offshore drilling by the Saudis in just two years.

This begs the question as to why, if Saudi Arabia insists that their onshore reserves are adequate to meet demand growth for twenty years, they are frantically exploring offshore for oil that would cost between three and ten times as much to produce as oil from their allegedly abundant onshore fields.

AMERICAN INFRASTRUCTURE

The Grid

Electricity is the foundation of modern industrial civilization. It has become so commonplace in most of the world that it is taken for granted or barely even noticed. Yet it is electricity that powers assembly lines, provides lights and air conditioning, refrigeration, telephones, computers, and TVs. Electric pumps provide all of the irrigation for our food supply as well as the water that comes out of our taps. It also pumps water out of New York City’s subway system 24/7 to allow trains to operate. Electricity is what pumps gasoline into your gas tank.

The American grid has been in trouble for a long time as a result of two prob-

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lems: lack of infrastructure maintenance and repair and shortages of natural gas to power generating stations which are still being built to meet new demand. Coal does provide a significant and growing portion of our electricity, but coal has brought with it the significant problem of greenhouse-gas emissions and very toxic waste, which so-called “clean coal” never acknowledges. (The term clean coal is a marketing gimmick because the technology does not remove the poisons from either the mining or the combustion – only the exhaust gasses. It has never been implemented commercially. I repeat . . . never in the process of commercial power generation has any so-called clean coal plant produced 1 kWh of electricity.)

There is also the problem that coal is not found everywhere in the nation, and it must be transported to those plants that use it – by rail on a railway system that has been neglected for decades. If we are going to use more coal, then we will need more trains and to fix the ones we have. More aggressive mining, including mountain-top removal, causes massive ecological damage and destroys forests. (I will have a lot more to say about coal in subsequent chapters.)

In August of 2005 President Bush signed a bill which repealed the Public Utility Holding Companies Act, or PUHCA. PUHCA was a New Deal measure that focused solely on public need. It mandated that owners of public utilities were prohibited from achieving a monopoly and – most importantly – that utility companies had to maintain excess generating capacity and infrastructure to provide for ten, twenty, and hundred-year weather events.

With the repeal of PUHCA it became possible for private investors, like Warren Buffet or Constellation Energy, to start



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gobbling up once publicly owned and/or regulated power companies. Just a couple of years ago Buffet gobbled up Constellation. The repeal (or deregulation) relieved the new owners of the mandate to keep excess capacity to prepare for weather-related emergencies. In the age of climate change where heat waves, floods, and severe cold snaps have become more frequent – even regular occurrences – this is just plain stupid. Also, since the repeal of PUHCA, privately owned utility companies may now selectively decide which customers get electricity and which don't. Computer technology now allows companies to decide to provide power to a major corporation across town and deny it to a rest home a block away. With deregulation, profit became not just the primary, but the sole criterion for success.

It is clear that this is what the new owners of private utilities intend. *U.S. News and World Report* wrote the following just four months after PUHCA was repealed:

The second threat is a severe electricity shortage in the Northeast – with possible brownouts or blackouts. Deregulated natural-gas-fired power generators, under no legal obligation to serve customers as the old monopoly electric companies were, can simply stop generating power. Some plants will be interruptible customers with no backup fuel source. But in other cases, power plants that have firm natural gas contracts will stop generating electricity anyway and sell their fuel at enormous profit. That is precisely what happened during the three-day January 2004 cold snap, when more than 25 percent of New England's generating capacity went off line and the reserve margin was near zero [emphasis mine]

Privately owned utilities are responsible to shareholders, not ratepayers. They have a completely different set of priorities and their first and governing responsibilities are profit, growth, and shareholder return. Privately owned utilities can now trade their energy reserves, whether natural gas, coal, or heating oil to other regions; not based upon need, not giving a whit about who freezes to death or whose small business is shut down. They will trade their energy for profit and for profit only. It is now legal for a privately owned Arizona power company to sell off natural gas to another power company in, say, Colorado or California just as a killer heat wave strikes the Southwest. Under a profit mandate this scenario is almost certain to occur, and people will die as a result.

There is also a trend towards the construction of “merchant power plants,” smaller generating stations dedicated to serving only corporate customers. In a January 2006 essay for *From The Wilderness* called “The End of the Grid” I wrote:

The term “merchant power plants” has come up in several stories. It suggests, though I have not been able to confirm it yet, that power companies will now be operating dedicated generating stations for industrial and corporate users with the best ability to pay. Weaker corporations, not on the “A” list, would be allowed to die-off leaving more energy for the rest. That would mean that a Boeing plant might have plenty of power sitting right next to a neighborhood that gets none at all due to selective service interruptions designed to “curb demand.” As if any residential user would voluntarily have their heat and power shut off during a cold winter.



Privately owned utilities can now trade their energy reserves, whether natural gas, coal, or heating oil to other regions; not based upon need, not giving a whit about who freezes to death or whose small business is shut down. They will trade their energy for profit and for profit only

Just after the great Northeast blackout in the Fall of 2003 I interviewed Matthew Simmons for *From The Wilderness*. His clients include entities like Kerr McGee and the World Bank. This is a lengthy quote but well worth reading because it addresses many of the issues we have just discussed.

FTW: What did happen?

SIMMONS: On a large scale what happened was deregulation. Deregulation destroyed excess capacity. Under deregulation, excess capacity was labeled as “massive glut” and removed from the system to cut costs and increase profits. Experience has taught us that weather is the chief culprit in events like this. The system needs to be designed for a 100-year cyclical event of peak demand. If you don’t prepare for this, you are asking for a massive blackout. New plants generally aren’t built unless they are mandated, and free markets don’t make investments that give one percent returns. There was also no investment in new transmission lines.

Underlying all this is the fact that we have no idea how to store electricity. And every aspect of carrying capacity, from generators, to transmission lines, to the lines to and inside your house, has a rated capacity of x. When you exceed x, the lines melt. That’s why we have fuse boxes and why power grids shut down. So we have now created a vicious cyclicity that progresses over time.

Another problem was that with deregulation, people thought that they could borrow from their neighbor. New York thought it could borrow from Vermont. Ohio thought that it could borrow from Michigan, etc. That works, but only up to the point where everyone needs to borrow at once and there’s no place to go.

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A second major reason is that decisions were made in the 1990s that all new generating plants were to be gas-fired. We've had a natural gas summit this year and, as you know, I have been talking for some time about the natural gas cliff we are experiencing. Many thought that this winter would be deadly, and I have to say that it's just a miracle that we have replenished our gas stocks going into the cold months. This winter could have been a major disaster. We've seen a price collapse in natural gas to the five to eight dollar range (per thousand cubic feet) and the only reason that happened was throughout almost the entire summer there were only a handful of days when the temperature rose above eighty degrees anywhere. That was miraculous. It allowed us to prepare for the winter but we shouldn't be optimistic. One good hurricane that disrupts production, one blazing heat wave, one freezing winter after that and we're out of solutions.

[Note: Simmons said this two years before Hurricanes Katrina and Rita.]

FTW: And natural gas too?

SIMMONS: Well, I know you understand it, but people need to understand the concept of peaking and irreversible decline. It's a sharper issue with gas, which doesn't follow a bell curve but tends to fall off a cliff. There will always be oil and gas in the ground, even a million years from now. The question is, will you be a microbe to go down and eat the oil in small pockets at depths no one can afford or is able to drill to? Will you spend hundreds of thousands to drill a gas well that will run dry in a few months? All the big deposits have been found and exploited. There aren't going to be any dramatic new discoveries and the discovery trends have made this abundantly clear.



One thing is certain. The cash generated by power companies won't go back into fixing the infrastructure, building energy reserves, or preparing for weather-related emergencies

We are now in a box we should never have gotten into and it has very serious implications. We also see the inevitable issues that follow a major blackout: no water, no sewage, no gasoline. The gasoline issue is very important. Our gasoline stocks are at near all time lows. With the blackout, more than seven hundred thousand barrels per day of refinery capacity were shut down. People were told to boil their water. So what do they do, they go to their electric stove which isn't working. What then?

Utility companies are what financial analysts call "cash cows." They produce enormous, predictable, and steady streams of cash as ratepayers pay their bills. This cash has enormous importance for private companies that it doesn't have for publicly owned companies. Because the economic paradigm calls for infinite growth, cash is used to grow private companies, whether through leveraged buy-outs of other utilities or to pay investors. Liquidity is what allows Wall Street to do "debt-service" or, in layman's terms, to make the minimum monthly payments on their credit cards. That's why utilities are so attractive for people like Warren Buffet and major investment banks.

One thing is certain. The cash generated by power companies won't go back into fixing the infrastructure, building energy reserves, or preparing for weather-related emergencies.

Roads To Ruin

On July 31, 2008, a Reuters news story proclaimed: "A \$1.6 trillion bill is coming due across the United States as governments face the daunting task of repairing roads, bridges and other parts of an aging infrastructure." On the one-year anniversary of the famous I-35 bridge col-

lapse in Minneapolis the story also noted heavy infrastructure damage as a result of 2008's heavy floods along the Mississippi River. It later added:

State transportation officials issued an estimate this week that at least \$140 billion was needed to make major repairs or upgrades to 152,000 of the nation's 590,000 bridges – one in four – deemed deficient. The spans that were built to last 50 years are on average 43 years old.

Much of the funding for these needed repairs will fall on the federal government. But remember that tax revenues are plummeting at every level of government due to economic recession and shrinking tax bases.

The very next day Reuters published another story, verifying a trend I had been predicting and writing about for four years. Its title: "Roads, airports on the block as budgets tighten." This was the lead:

NEWYORK (Reuters)—Cash-strapped US state and city governments are likely to sell or lease more highways, bridges, airports and other assets to investors desperate for stable returns after being frazzled by the credit crisis.

The trend is set to pick up speed given worsening budget deficits in state capitals and city halls nationwide.

It will also be welcomed by Wall Street bankers hoping to help create and market so-called "infrastructure" transactions at a time many debt markets remain paralyzed, and after major US stock indexes fell into bear market territory.

"When you are nervous about everything else, you put your money in a toll road . . ."



If I were a corporation, I would be tickled to death to have taxpayer money build a series of very expensive roads which my corporation or bank could then buy for pennies on the dollar ... and charge people fees to use. Then, when my company had run the road or airport down to the point of failure, I could always go to the federal government and ask for a bailout

The Pennsylvania Turnpike is up for sale or lease (whichever is better). So is Chicago's Midway airport. New York's Governor David Patterson is looking at many options along these lines. Hey, let's sell the Washington Monument or the Statue of Liberty. There's a way to raise cash!

A close read of the story revealed that (among others) Goldman Sachs, Citigroup, Morgan Stanley, The Carlyle Group, Credit Suisse, and General Electric have already dedicated more than \$25 billion to these purchases or leases of public property. Only Credit Suisse has escaped blistering criticism from me in the past on other issues. Goldman Sachs is the scariest; they seem to be the recruiting pond from which the United States draws its treasury secretaries lately. Robert Rubin and Henry Paulson both came from Goldman Sachs. Goldman started a \$6.5 billion infrastructure fund in 2006 and, according to Reuters, is starting another \$7.5 billion fund.

If I were a corporation, I would be tickled to death to have taxpayer money build a series of very expensive roads which my corporation or bank could then buy for pennies on the dollar (on easy credit before September 2008) and charge people fees to use. Then, when my company had run the road or airport down to the point of failure, I could always go to the federal government and ask for a bailout. Heck, everybody else is getting or asking for a bailout, even Larry Flynt!

However, by late 2009 the double-edge sword of monetary collapse had put a damper on these proposed "solutions". A *USA Today* story on October 27th reported that "Privately run infrastructure deals dry up" as cash shortages had made it impossible for investment banks like Goldman Sachs to leverage enough

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capital to make the purchases. Among the deals that had vanished recently was Chicago's plan to sell Midway airport.

Peak Traffic And Upside-Down Thinking

Even as private and government experts are saying clearly that cheap gasoline is transitory and a thing of the past; and while unemployed Americans are driving much less because they can't afford gasoline . . . at any price, budget experts are planning for new road expansions as if traffic were going to continue to increase as it has for the last seven decades. The United States is currently building roads almost as fast as it did in the 1950s when the Interstate Highway System was implemented as a matter of national security. Here's an example:

MarketWatch Aug 1, 2008 – By the year 2032, the U.S. population is expected to reach 363.5 million persons, adding an estimated 49 million drivers and 58 million vehicles to America's highways. Wasted fuel from traffic delays will more than double, to 6.5 billion gallons. Carbon dioxide emissions traced to congestion will increase to 60 million tons.

But there's a major rub here. U.S. traffic peaked in 2005, the same year that experts said that oil production apparently did. Americans are actually driving less, and that is a certainty where millions are unemployed and have no jobs to drive to or money to buy gasoline with, even at \$2–3 a gallon. I predict that these demand-destruction, cheap prices will be a permanent thing of the past by the end of 2009 and that the next price spike in oil will serve as the coup de grace for the



At a time when the government and every recognized expert is telling us not to expect cheap gasoline to last, and when all the oil production and depletion data suggest that we may one day look back on four-dollar gas with longing, why has the United States embarked on one of the most massive road building campaigns in history?

U.S. and world economies.

Data collected by the Bureau of Transportation statistics show that vehicle miles travelled peaked and leveled off at the onset of \$3 gasoline in 2005. \$4 gasoline in July 2008 caused them to markedly drop. At a time when the government and every recognized expert is telling us not to expect cheap gasoline to last, and when all the oil production and depletion data suggest that we may one day look back on four-dollar gas with longing, why has the United States embarked on one of the most massive road building campaigns in history? This includes the construction of massive NAFTA Superhighways so that tomatoes can be trucked from Mexico to Canada and Canadian wood products can be driven to Mexico.

A spike, even back to \$3.25 gasoline has caused as much hardship in 2009 as \$4 gasoline did in 2008. And for those who hope that an economic recovery will absorb all of this, remember that no economic recovery is possible even close to where we were in early 2008 without driving oil consumption back up to where it was then. Contrast that with a 9% decline rate. The numbers just don't balance. They never have, and this is what M. King Hubbert so clearly understood in the late 1940s.

[Excellent research on the topic of unnecessary road building and airport expansion has been done by Mark Robinowitz. He maintains an excellent web site at <http://www.road-scholar.org>.]

With food shortages already occurring, what kind of sense does it make to pave over land that may be needed for food with asphalt made from oil? Is there some pork-barrel spending hidden away here? It sure smells like it.

Federal, state, and local governments

are suffering from severe asphalt shortages caused by oil prices and demand. Streets are going unrepaired, potholes are damaging cars, and existing roads are wearing out. Why build new roads, and take on the responsibility for maintaining them, for what is certain to be fewer cars travelling fewer miles when we aren't able to repair the roads we already have?

In early 2009 one might have argued that oil's falling to around \$40 would take care of the asphalt prices. But that didn't last, did it? Now go look at the budgets of state and local governments and see if there is any money left to buy even cheap asphalt. Energy and money are indeed Siamese twins.

The same holds true for many of the dozen or so major airport expansions that are being planned around the country. Why plan to expand airports when airlines are struggling to stay flying? They are cutting back flights to avoid bankruptcy, and the industry is widely predicted to have a bigger shakeout that will further reduce the number of carriers and flights.

The key to understanding infrastructure lies at the heart of complex civilizations. When roads and bridges fail; levees aren't rebuilt; when dams, transmission lines and generating stations are not maintained; when any of a hundred possible things fail for lack of money or material . . . civilization starts to break down.

Consider the implications if a bridge washes out and that bridge is the only way to get heating oil to a small city in winter. Consider the implications if a gasoline or diesel tanker truck crashes and burns on a defective bridge. Consider the implications if a main sewer line collapses in New York City and takes three subway lines out of service. Consider the implications if the electricity, generated by oil or



When roads and bridges fail; levees aren't rebuilt; when dams, transmission lines and generating stations are not maintained; when any of a hundred possible things fail for lack of money or material . . . civilization starts to break down

natural gas, stops providing the power to pump water out of those subways 24/7.

The Alternative Energy Infrastructure . . .

. . . does not exist.

On top of all the maintenance needed just to keep everything running as it is, the proponents of alternative energy sources like solar, tidal and wind power almost never mention the infrastructure to make such propositions work. Plans to dramatically expand the use of wind power have yet to fully explain how thousands of miles of transmission wires and transformers are going to be built and who is going to pay for them. The world is experiencing huge commodity shortages, and copper is one of the most precious. Wind doesn't blow 24 hours a day, and the grid has no ability to store electricity generated at midnight that might be needed at 3 P.M. the next day when temperatures soar. The battery technology to store electricity on a large scale doesn't exist. Batteries are very expensive and don't last that long. Even the batteries in vaunted hybrid cars need to be replaced after 70 or 80 thousand miles.

Hydrogen remains the cruelest hoax ever perpetrated on an unsuspecting public. Hydrogen is the smallest atom in the universe: one proton and one electron. It bleeds through many metals and has a tendency to turn them brittle to the breaking point. It cannot be pumped through the hundreds of thousands of miles of existing natural gas pipelines. Those are needed for natural gas, and the pipes can't handle hydrogen. So California's Hydrogen Highway, touted by Governor Schwarzenegger, is a true pipe dream.

Solar poses similar problems. It takes

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large quantities of energy and resources to make solar cells. As of this writing my best research indicates that it takes about five years to get a positive return on the energy invested to manufacture the best solar panels. Solar does have one distinct and overwhelming advantage over all other alternative energies: It can be installed where it is used so there is no need for major infrastructure investments to make it work over distance. It is scalable. But what do we do for electricity at night or on a cloudy day?

The old system must be kept working.

These are questions that an American president and congress will play decisive



Solar poses similar problems. It takes large quantities of energy and resources to make solar cells

roles in answering. As the sign on Harry Truman's desk said, "The buck stops here."

In one of my favorite all time essays, "GlobalCorp" from March of 2005, I wrote the following and it gives me no pleasure to see it coming true:

As the human race blows itself into extinction or destroys the climate or starves itself to death, the last corporate merger and acquisition will take place. And at the same moment as mankind dies, the CFO of "GlobalCorp" will be shouting, "Hooray! We did it!"

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