UNITED STATES SENATE REPORT

The Real Story Behind China's Energy Policy
And What America Can Learn From It

United States Senate Committee on
Environment and Public Works

Minority Staff

Released: December 8, 2010

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Executive Summary

- The facts about "clean energy" in China are clear: non-hydro renewables, despite considerable government support, **make up less than 1 percent of China's energy portfolio**—a fact that will change little over at least the next two decades.

- China is not leading a green energy revolution: **it is leading a global race for oil, natural gas, coal, and nuclear power**—energy sources fueling China's growing population and economic growth.

- Rare earth minerals are necessary to produce wind turbines, solar panels, advanced batteries, energy efficient lighting, and many other energy technologies. **China produces about 97 percent of the world's supply, *while the U.S. produces none***. China's dominance in developing rare earth minerals provides enormous trade leverage over American manufacturers. We should reduce this dangerous dependence by encouraging more domestic mineral production.

- A clean-energy manufacturing sector must have stable, affordable, energy costs to thrive and expand. **Renewable energy mandates and cap-and-trade make energy more expensive, and would send manufacturing jobs overseas**.

Facts on China

Coal

- China is both the largest consumer and producer of coal in the world. **China is using more coal than the United States, Europe, and Japan combined**.

- China could account for ***50 percent* of global coal demand by 2035**.

Oil and Natural Gas

- China is the **world's second largest oil consumer, behind the U.S., and the world's fourth largest oil producer**.

- China is investing in oil development projects in **Cuba, Iran, Iraq, Myanmar, Kazakhstan, Nigeria, Venezuela, and Argentina**.

- China will become the top natural gas consuming country in the Asia Pacific region, overtaking Japan by 2015.

Nuclear

- China **aims to at least quadruple its nuclear capacity** from that operating and under construction by 2020.

Renewables

- The vast majority of China's 15 percent renewable energy target **will be met with new hydropower (dams) and new nuclear power plants**.

The Bottom Line

Point #1: Activists and the Obama Administration believe a "price on carbon" and government mandates are essential for the U.S. to produce innovations in wind, solar, and other energy technologies. But in truth, such policies would be ruinous to jobs, new energy technology, and the global competitiveness of America's manufacturers.

Point #2: China is rapidly expanding by embracing the reality that fossil fuels, along with nuclear power, are the engines of economic growth and prosperity. Policymakers in the U.S. must also embrace this reality—and resist the misguided and unfounded temptation that government mandates are the pathway to America's economic resurgence.

Point #3: America has an array of clean energy technologies that are readily deployable. Their development can create thousands of jobs, provide affordable, reliable electricity, and keep America's manufacturers globally competitive, especially with China. But environmentalists oppose nearly all of them.

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I. Introduction

New York Times columnist Thomas Friedman has argued that America stands at "a strategic inflection point," by which he means that America faces a choice: either pass cap-and-trade legislation and federal mandates on renewable energy or lose the "clean energy race" to China. As Friedman wrote:

> We are either going to put in place a price on carbon and the right regulatory incentives to ensure that America is China's main competitor/partner in the E.T. [energy technology] revolution or we are going to gradually cede this industry to Beijing and the good jobs and energy security that would go with it.[1]

For Friedman, federal mandates are the best drivers of innovation in domestic "clean energy" manufacturing; without them, he claims, America will lose thousands of "green jobs" to China.

This argument has many parts. The most central is the phrase "price on carbon." It is a euphemism for cap-and-trade and other energy taxes designed to make electricity, gasoline, and much else more expensive for consumers—and to increase government regulations.

Of course, Friedman's vision echoes the Obama Administration's wider agenda of forging a green economy in America. In his 2009 State of the Union address, the President held China up as an example of how other countries are taking greater strides than the U.S. on clean energy:

> We know the country that harnesses the power of clean, renewable energy will lead the 21st century. And yet, it is China that has launched the largest effort in history to make their economy energy efficient … Well I do not accept a future where the jobs and industries of tomorrow take root beyond our borders – and I know you don't either. It is time for America to lead again.[2]

And in his widely-quoted "New Foundation" speech, Obama explained that "the only way to truly spark this transformation is through a cap on carbon pollution, so that clean energy is the profitable kind of energy."[3]

It is these policies that Friedman and others have deemed essential for the U.S. to dominate wind, solar, and other "green" technology innovation. But in truth, such policies would be ruinous to jobs, new technology, and the global competitiveness of America's businesses.

The "clean energy race" between the U.S. and China—and the lament that America is losing—is an idea concocted by activists to promote cap-and-trade, renewable energy mandates, and greater government control of the economy. It is premised on a biased, narrow picture of China's energy development–and the demonstrably false notion that economic growth and innovation are best realized through government mandates.

What Is Clean Energy?

Before examining these arguments, it's necessary to define clean energy. Clean energy includes, among others, wind, solar, tidal, geothermal, hydropower, biomass, nuclear, clean coal, natural gas, and some bio-fuels.[4]

This definition is uncomfortably broad for many environmental activists: they deplore hydropower because of dam construction; denounce clean coal as an oxy-moron[5]; oppose emissions-free nuclear because of waste issues[6]; worry that tidal energy harms marshes and mud flats[7]; and stop solar power because of concerns over endangered species and offshore wind farms because they are aesthetically distasteful.[8] They also claim to support clean-burning natural gas, but want to stop domestic gas production.

In short, America has an array of clean energy technologies that are readily deployable. Their development can create thousands of jobs, provide affordable, reliable electricity, and keep America's manufacturers globally competitive, especially with China. But environmentalists oppose nearly all of them.

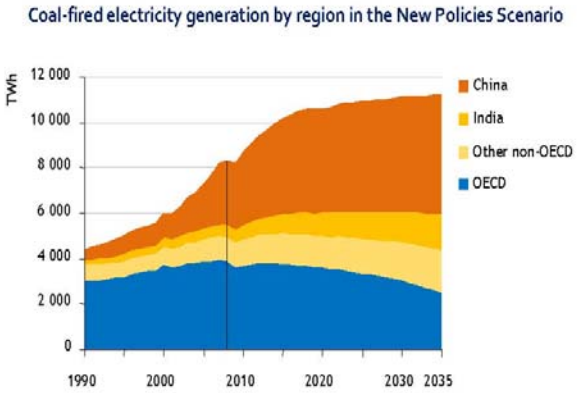
Facts on China

"[W]hatever China's accomplishing on wind and solar, it's a sideshow." **Newsweek Columnist Robert Samuelson, June 21, 2010**

The facts about "clean energy" in China are clear. First, non-hydro renewables, despite considerable government support, make up just *.06 percent* of China's energy portfolio. As *Newsweek* Columnist Robert Samuelson wrote:

> [W]hatever China's accomplishing on wind and solar, it's a sideshow. In 2008, fossil fuels met 87 percent of its energy needs, reports the International Energy Agency. Coal alone accounted for 66 percent. China represents about half the world's hard coal consumption. Usage grew 10.7 percent annually from 2000 to 2008.[9]

This isn't likely to change. "No matter how much renewable or nuclear is in the mix," said an energy analyst with the Asian Development Bank, "coal will remain the dominant power source."[10] By 2030, projections show the "use of coal and oil as generation of electricity is steadily increasing and is projected to account for approximately 80% of energy production" in China.[11] The following graph from the International Energy Agency's recent World Energy Outlook 2010 speaks for itself:



To the extent China is building wind turbines and solar panels, it is propping them up with costly subsidies, feed-in tariffs, and cheap credit, distorting the true costs. China's renewable subsidy regime is even being challenged by the United Steel Workers, who recently filed a complaint with the World Trade Organization (WTO), alleging that China illegally subsidizes its "clean energy" industry (but, ironically, not alleging that the United States does the same).[12]

Recognizing that renewable energy is not always worth the cost, China actually began *pulling back* some of these subsidies. As Greentech media reported:

> Concerned by the high cost of solar—which can be four times more expensive than fossil fuels—and fears that solar power won't deliver on some of the anticipated goals, the Chinese government is not about to subsidize solar power on a national level, Shi Lishan, deputy director in China's energy bureau said…[13]

It's also important to note how China defines "clean energy." In the U.S., hydropower is anathema to environmentalists.[14] Yet in China, it's essential, for two reasons: 1) to meet growing demand for electricity; and 2) to meet its 15 percent renewable energy target. "Hydropower is the key to reaching that target," a Chinese official told *Reuters*. "It will make up 9 to 10 percentage points out of the 15."[15][16] In other words, hydro will provide *two-thirds* of the target. Overall, China has "seven and a half times more hydroelectric capacity than the United States has currently or expects to have by 2020.[17]

In addition, new nuclear power plants will help meet the target. This stems from a policy change that took effect on April 1, 2010, in which the scope of China's renewable target was broadened to "non-fossil-fuel sources," including nuclear.[18] *China Daily* reports that, according to an official in China's Energy Bureau of the National Development and Reform Commission, "nuclear should contribute up to six percentage points."[19]

In sum, then, solar, wind, and other alternative sources will comprise a miniscule fraction—probably around 1 percent—of China's much-hyped 15 percent renewable target.

A Penchant for a "Managed Economy"

As noted, activists' lament of America as clean-energy-laggard is a stalking horse for greater government control of the free market. In fact, these activists unabashedly praise China's communist system for its ability to institute top-down edicts, without debate or deliberation.

This is what Friedman meant when he wrote in 2009: "One-party autocracy certainly has its drawbacks. But when it is led by a reasonably enlightened group of people, as China is today, it can also have great advantages."[20] Similarly, Joe Romm, author of the Climate Progress blog, fears China is "going to [be] eating our lunch and take our jobs on clean energy" because American doesn't have China's "managed economy."[21]

In this, Friedman and Romm are right: despite liberalization that began in the 1970s, China has a "command and control economy," in which "the national government owns or controls many of the country's industries and enterprises."[22] In a recent front-page story, the *Wall Street Journal* reported that market advocates in China often use the phrase "guojin mintui," which means "the state advances, the market retreats." This accurately captures the evolution of China's economy over the last decade. In a report released in January, the Organization for Economic Cooperation and Development (OECD) found that China's economy was the least competitive of 29 countries surveyed.

China's economy is managed through all-encompassing, Soviet-style 5-year plans, which the *Wall Street Journal*

describes as "relics of the Mao command economy." These plans encapsulate key policy goals developed by bureaucrats in Beijing. These goals, in turn, are carried out through various channels of government. Communist party officials partner with favored businesses to promote their interests by providing subsidies and cheap credit. Ultimately, "Chinese households… effectively subsidize the state's industrial darlings."[23]

In short, the Chinese system should not be emulated in the U.S. What should be emulated is one important foundation of China's energy policy, which recognizes the contribution of wind, solar, geothermal, hydropower, and other alternative energy sources—but also embraces the reality that coal, oil, natural gas, and nuclear power are, and will be, the engines of economic growth, energy reliability, job creation, and global competitiveness.

A Note on Innovation and Markets

"A market system—one in which individuals, not the government, make decisions about how to use most of the economy's resources—provides entrepreneurs one of the best environments in which to flourish." **The Federal Reserve Bank of Dallas, "Everyday Economics: Entrepreneurs and the Economy."**

The political left's praise of China is redolent of progressives' encomiums to the Soviet Union in the 1930s and 1940s. It also stems from a belief that government regulation inspires innovation. Yet as Pultizer Prize-winning author Daniel Yergin put it recently:

> I remember when I was first working on *The Prize*, and people asked me "What's the book about?" and I realized that when you are writing about energy you are also writing about the history of innovation because again and again people think "We have now come to the end, there is nowhere to go." And what happens? Innovation – problems get solved.[24]

Yergin continued that "we see [innovation] with the entrance of Silicon Valley and venture capital…"[25] In other words, the private sector, not government, is the driver of innovation. Consider Microsoft, Intel, Apple, and Oracle, all dominant U.S. players in the global marketplace, each of which emerged without innovation-specific mandates on the technology sector.

Moreover, innovation flows from entrepreneurs who take risks in the marketplace. They prosper when government remains on the sidelines. As the Federal Reserve Bank (FRB) of Dallas observed:

> A market system—one in which individuals, not the government, make decisions about how to use most of the economy's resources—provides entrepreneurs one of the best environments in which to flourish. In a free market, the potential to make a profit supplies a huge incentive for entrepreneurs to come up with new and better ideas.[26]

Friedman and his fellow travelers believe government should make consumers pay more for energy to send a "signal" to the marketplace, and mandate production of certain types of energy—thereby incentivizing clean energy innovation. But

this is exactly backwards. As FRB of Dallas noted:

> In a system in which the government or some central planner owns the nation's resources and decides how they are allocated, entrepreneurs do not profit from their successes; thus, there is a much smaller incentive for them to be creative.[27]

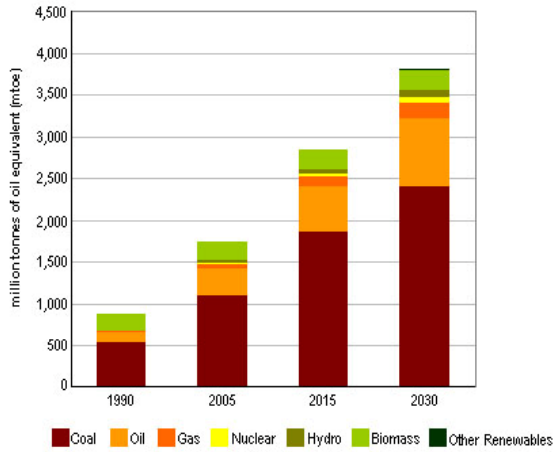
John Doerr, a longtime venture capitalist, and an advocate for cap-and-trade and federal renewable energy mandates, testified before the Senate Committee on Environment and Public Works that, "America must bet more on its entrepreneurs."[28] Doerr is right: America should bet more on entrepreneurs, not on government bureaucrats. American taxpayers should not subsidize more expensive and unreliable forms of energy, simply because Communist China does.

The more sensible policy is one that allows energy technologies of all sorts to compete in the marketplace for commercial use. This competition will provide affordable, reliable energy that will help American consumers, encourage the development of innovative energy technologies, and reduce the burden imposed by an overreaching bureaucracy.

II. China's Real Energy Race

> *"China is currently constructing the equivalent of two, 500 megawatt, coal-fired power plants per week and a capacity comparable to the entire UK power grid each year."* **MIT, "The Future of Coal: An Interdisciplinary MIT Study"**

Contrary to Friedman's assertions, China is not leading a green energy revolution; it is leading a global race for oil, natural gas, coal, and nuclear power—energy sources fueling China's growing population and economic growth. The following chart, courtesy of the World Resources Institute, depicts China's energy future[29]:



As is starkly obvious, the future of "renewables" in China—meaning, for Friedman and other environmental activists, wind and solar power—is and will be dwarfed by coal, oil, and natural gas.

This is not to say that China is ignoring wind and solar. As the Congressional Research Service reported, "installed wind power capacity has gone from 0.567 GW in 2003 to 12.2 GW in 2008,"[30] an impressive increase. Moreover, China intends to expand its wind power capacity to 100 GW by 2020. As for the solar photovoltaic sector, China intends to increase generating capacity from 0.14 GW as of 2009 to over 1.8 GW by 2020. Put in context, 1.8 GW is about the equivalent of a new nuclear power plant.

So in sum, gains made in renewables, while significant in and of themselves, amount to little when measured against China's overall energy mix—which is and will be dominated by fossil fuels.

In addition, while China's leaders clearly understand the environmental implications of their energy future–sand are seeking ways to address them–their energy policy is motivated primarily by a desire to lift their citizens out of poverty. This desire overrides other concerns, including those about carbon emissions, climate change, or global warming. As Yu Qingtai, China's chief climate negotiator, said in a speech in August:

> We cannot blindly accept that protecting the climate is humanity's common interest; *national interests should come first…The country has to develop … and if that increases emissions, I say, 'So what?' The people have a right to a better life*. [emphasis added][31]

China has pledged to reduce its carbon intensity (the amount of carbon it emits per unit of GDP) by 40 to 45 percent from 2005 levels by 2020. But this pledge, which an Obama Administration official

called "disappointing,"[32] is empty, as it's nothing more than "business as usual"—or what will happen given the policies China already has in place.[33]

Coal

"By any measure, the story of coal in China is remarkable." **The International Energy Agency, World Energy Outlook 2010**

One cannot have a clear picture of China's energy policy without considering its production and consumption of coal. It is the workhorse of China's economic expansion. In its new World Energy Outlook, the International Energy Agency (IEA) declared, "By any measure, the story of coal in China is remarkable." IEA found that China could account for *50 percent* of coal demand by 2035.[34]

According to the Department of Energy's Energy Information Administration (EIA), coal "makes up 74 percent of China's total primary energy consumption, and China is both the largest consumer and producer of coal in the world."[35] China is using more coal than the United States, Europe, and Japan combined.[36] EIA found that, in 2009:

> China consumed an estimated 3.3 billion short tons of coal, representing over 40 percent of the world total and a 167 percent increase since 2000. Coal consumption has been on the rise in China over the last nine years, reversing the decline seen from 1996 to 2000. Coal production, also rising, was an estimated 3.2 billion short tons in 2009.[37]

According to several estimates, China is building one to two coal plants a week. The *New York Times* described the pace of coal plant construction as "frenetic."[38] As part of that process, China is rapidly replacing older coal units with more modern, cleaner burning plants. "We should grasp the opportunity arising from the current decline in power demand to speed up the closure of small power plants and their replacement with large ones," said Zhang Guobao, head of China's National Energy Commission.[39] By 2011, the World Resources Institute (WRI) noted, "China plans to close all plants below 50 MW of capacity, and old plants below 100 MW." Between 2011 and 2020, many plants between 100 and 200 MW will also be closed.

But unlike in the U.S., China is replacing old coal with new coal—equipped with the latest technology that can burn coal more efficiently, and therefore more environmentally friendly. IEA estimates that by 2011, "80 percent of China's coal-fired power plants will be modern plants above 300 MW in capacity and this number will rise above 90 percent by 2020."[40] Last year, the government announced that by 2011 it will replace 31 GW of coal-fired power plants with newer, more energy-efficient models. All of this construction is making China the world's leader in building state-of-the-art coal plants:

> In 2008, China's National Development and Reform Commission adopted a standard requiring all new coal-fired power plants to be state-of-the-art commercially available or better technology. As a result, today most of the world's most efficient (supercritical and ultra-supercritical) coal-fired power plants are being built in China.[41]

These plants can achieve thermal efficiency rates around 46 percent, compared to 33 to 43 percent for conventional coal plants.[42] Siemens Corporation reports that just a 1% gain in efficiency for a typical 700MW plant significantly reduces the 30-year lifetime emissions of NOx, SO2, particulates, and CO2.

On November 29, U.S. Energy Secretary Steven Chu delivered an address in which he worried that, with respect to the clean energy race with China, "time is running out" for America.[43] Among other things, Chu noted and praised China's rapid development of clean (specifically, ultra-supercritical) coal technology. Yet in a slide titled, "What America's innovation could produce," this technology isn't even cited.[44]

In fact, environmental activists in the U.S. have scuttled 139 coal plants over the last decade.[45] This effort is spearheaded by the Sierra Club, which "aims to move our economy toward a clean energy future by stopping new coal-fired plants, phasing out existing plants, and keeping the massive U.S. coal reserves in the ground and out of international markets."[46]

The future path for coal in China's is clear: "No matter how much renewable or nuclear is in the mix," according to Ashok Bhargava, a China energy expert at the Asian Development Bank, "coal will remain the dominant power source."[47]

Nuclear

China aims "at least to quadruple its nuclear capacity from that operating and under construction by 2020." **World Nuclear Association, August 2010**

In addition to state-of-the-art coal plants, China is building new nuclear power plants. The Chinese National Nuclear Corporation, a state-owned entity with 100 subsidiary companies, is "working hard at pushing forward the peaceful use of nuclear energy, building a robust, safe and fast-growing nuclear industry and creating a new energy era."[48] While nuclear will not be a significant part of China's energy mix, the government nonetheless recognizes that nuclear power has an important role in strengthening the nation's energy security.

The *New York Times* recently reported that China is preparing to "build three times as many nuclear power plants in the coming decade as the rest of the world combined . . . [with] construction starting on as many as an additional 10 each year."[49]

China currently has 13 operating reactors. According to the World Nuclear Association, 25 reactors are under construction. "Many more units are planned," the WNA reported, "with construction due to start within three years." China recently raised its goal for new nuclear capacity to 112 GWe by 2020[50] with longer term goals of "200 GWe by 2030, and 400 GWe by 2050."[51] In comparison, the current nuclear capacity in the U.S. is 101 GWe.[52] Total investment in nuclear power plants, will reach CNY 500 billion ($75 billion) by 2015, according to China National Nuclear Corporation (CNNC).[53] (Why the GWe vs GW)

On November 22, CNNC announced the start of construction on a 650-megawatt nuclear reactor in the southern island province of Hainan. This brings the total number of nuclear reactors under construction in China to 26, nearly half of the 58 reactors under construction worldwide. [54]

Earlier this year, CNNC announced plans to develop a nuclear energy industrial park at Haiyan to support China's rapid nuclear expansion. The Haiyan complex is estimated to cost $175 billion over the next ten years, and its mission will include "development of the nuclear power equipment manufacturing industry; nuclear training and education; applied nuclear science industries (medical, agricultural, radiation detection and tracing); and promotion of the nuclear industry."[55] While most of China's nuclear development currently relies on imported technologies, its experience in nuclear construction also means that "China is rapidly becoming self-sufficient in reactor design and construction".[56]

China has also declared its intention to become self-sufficient in nuclear fuel production. However, the dramatic pace of reactor development requires increasing imports of uranium as well as conversion, enrichment, and fabrication services. CNNC continues to increase development of uranium production in Mongolia and Xinjiang[57] while seeking to acquire additional resources in Australia, Canada, Kazahkstan, Uzbekistan, and several African nations either solely, via partnerships, or through long-term contracts.

As an example, China recently entered into a strategic partnership with France, the world's second largest generator of nuclear power, to build reactors and exploit uranium mines, amounting to $20 billion in business contracts, including a $3.5 billion deal for 20,000 metric tons of uranium. "We have decided to work without limits on a strategic collaboration in the nuclear domain that will go much farther on the full spectrum of nuclear activity," French President Nicolas Sarkozy said. The two countries plan to work on nuclear reactors, fuel recycling and uranium extraction and may sell the products of their collaboration to third parties.[58]

Oil and Gas

"The Chinese government's energy policies are dominated by the country's growing demand for oil and its reliance on oil imports." **U.S. Department of Energy, the Energy Information Administration, Country Analysis Briefs, 2010**

Oil is critical to China's growing economy. As the Energy Information Administration explains, "The Chinese government's energy policies are dominated by the country's growing demand for oil and its reliance on oil imports."

Indeed, China is the world's second largest oil consumer, behind the U.S., and the world's fourth largest oil producer.[59] The IEA projects that Chinese oil consumption will more than double from 7.7 million barrels per day in 2008 to 16.3 million barrels per day by 2030. As the Center for American Progress explained, China's skyrocketing oil consumption is due in good measure to its growing demand for cars:

> China's exploding demand for autos, fueled by a growing middle class, made it the largest automobile market in the world by the end of 2009. About 16 Chinese families out of 100 owned a vehicle in 2005, but this doubled to 33 out of 100 in 2008. And McKinsey estimates that the Chinese vehicle fleet will increase tenfold between 2005 and 2030.[60]

China also sees a threat in the form of increasing oil imports, which now comprise 52 percent of domestic oil consumption. According to a report by the Chinese Academy of Social Sciences, 64.5 percent of China's oil consumption will likely be met by imports in 2020. With growing dependence on imports, Chinese National Oil Companies are seeking to control them by investing in oil and gas projects overseas. This activity can be traced to the Fifth Plenum of the 15th Communist Party of China in 2000, when officials recommended a "going-out strategy" for China's 2001-2006 five-year plan. A "going-out strategy" simply means securing crude oil reserves from abroad.

The China Petroleum & Chemical Corporation is doing just that: it is investing in oil development projects in Cuba, Iran, Iraq, Myanmar, Kazakhstan, Nigeria, Venezuela, and Argentina. As the Center for American Progress (CAP) has noted, "this heavy investment can funnel money to unstable or dangerous regimes." China, for example, has been the largest foreign investor in Sudanese oil fields. China is also investing in America's neighbors, as it recently bought a stake in Canadian oil production and attempted to takeover a large American oil company in 2005.[61]

Such investment in foreign oil will continue unabated. The Chairman of PetroChina Co. has said that it is planning to invest at least $60 billion for foreign acquisitions in the next decade.[62] A survey of China's most recent overseas oil deals finds that "these contracts hold the combined potential to deliver more than 7.8 billion barrels of oil to China."[63]

China is also aggressively consuming and developing natural gas at home. According to the International Energy Agency, "China will become the top natural gas consuming country in the Asia Pacific region, overtaking Japan by 2015."[64] Since 2004, IEA reports, China's natural gas consumption "rate has increased by more than 20 percent, far above the country's GPD growth rate."

To encourage domestic gas production, China is taking advantage of the Kyoto Protocol's Clean Development Mechanism (CDM), funded in part by U.S. taxpayers. China is securing carbon credits under the CDM by constructing coal-bed methane power plants. As a result, China's domestic CDM market is attracting international business investment.

China's natural gas boom is spurring new pipeline and infrastructure construction. Take, for example, the "West-East" pipeline, completed in 2004, which extends from the west end to the east and southern parts of China. "This gigantic pipeline," according to IEA, "opened a new stage in China's natural gas market, from local business to a nationwide business."[65] China is also investing in projects to import gas, such as the Central Asian pipeline, which will deliver 30 bcm of natural gas from Turkmenistan, through Uzbekistan and Khazakhstan. In addition, China is building three liquefied natural gas terminals that will begin accepting natural gas in a few years.[66]

Renewables

"Concerned by the high cost of solar—which can be four times more expensive than fossil fuels—and fears that solar power won't deliver on some of the anticipated goals, the Chinese government is not about to subsidize solar power on a national level, [said] Shi Lishan, deputy director in

China's energy bureau…"
Greentechmedia.com, April 22, 2010

Environmental activists frequently tout China's renewable energy law, adopted in 2006, and modified in 2009. The law sets two targets: 500 GW of renewable electricity (300 from hydro, 150 from wind, 30 from biomass, and 20 from solar) by 2020, and 15 percent of *final* energy consumption from renewables by 2020. These targets prompt two responses: they are not mandates, and the devil is in the details.

First, the law was revised in 2009 to broaden what qualifies as renewable; China now includes "non-fossil fuel sources," which includes nuclear—a fact that environmentalists fail to report. Also, the capacious definition includes hydropower, another inconvenient fact for activists, who, along with opposing nuclear, have blocked hydropower expansion in the U.S.[67]

But in China, when it comes to "clean energy," hydro is paramount: nearly two-thirds of China's 15 percent renewable energy target will be met with hydropower. "Hydropower is the key to reaching that target," a Chinese official told *Reuters*. "It will make up 9 to 10 percentage points out of the 15."[68][69] This hydropower build-out amounts to "seven and a half times more hydroelectric capacity than the United States has currently or expects to have by 2020.[70] While China's hydro goal remains at 300 GW by 2020, the World Watch Institute projects that China has a potential of 500 GW of generating capacity.

China's market for wind power is growing rapidly, but it must be put in context. According to the Energy Information Administration's International Energy Outlook for 2010, "the fastest-growing non-OECD regional market for wind power is attributed to China, where total generation from wind power plants increases from 6 billion kilowatthours in 2007 to 374 billion kilowatthours in 2035." However, as EIA points out, "the total increase in China's wind-powered generation is less than half the increase in its hydroelectric generation."[71]

What's more, despite rapid wind and solar development, both sources will comprise an inconsequential part of China's energy mix in the coming decades. As Keith Bradsher wrote for the *New York Times*:

> China intends for wind, solar and biomass energy to represent 8 percent of its electricity generation capacity by 2020. That compares with less than 4 percent now in China and the United States. Coal will still represent two-thirds of China's capacity in 2020, and nuclear and hydropower most of the rest.[72]

When it comes to renewable electricity, China charges electricity customers a fee: residential electricity bills increased by 0.25 percent to 0.4 percent; the fee recently doubled to roughly 0.8 percent of the electricity bill for industrial users. It also charges a "feed-in tariff" for onshore wind and biomass; exempts renewable projects from local income taxes; established a "Golden Sun" program providing capital subsidies for solar PV installations; and a program providing preferential tariffs for solar PV.[73]

Grid operators are also reimbursed for buying renewable instead of coal-fired power. But operators are not paid for building transmission lines to connect wind turbines in remote areas to more populated

ones. As a result, transmission losses "are high for sending power over long distances to cities…"

As the Times' Bradsher points out, even after considerable government subsidies, "nearly a third of China's wind turbines are not yet connected to the national grid."[74] "When combined with low tariffs," CRS stated, "this likely means that China's wind power sector has been operating at a loss."[75]

Bradsher also noted that "China's commitment to renewable energy is expensive." Wind-generated power is 20 to 40 percent more expensive than coal; solar is at least twice as expensive. Thus wind and solar—as is the case in the U.S.—need government subsidies to make it more competitive with fossil fuels. Those subsidies take many forms. As CRS reported, "Financial support for renewable energy in China involves subsidies, tax policies, pricing mechanisms, and a reward scheme for green production."[76]

Yet China is now pulling back some of these subsidies, as it faces the high relative cost of renewable energy, particularly solar. Greentech media reported the following in April:

> Concerned by the high cost of solar—which can be four times more expensive than fossil fuels—and fears that solar power won't deliver on some of the anticipated goals, the Chinese government is not about to subsidize solar power on a national level, [said] Shi Lishan, deputy director in China's energy bureau…[77]

III. China, Rare Earths, and Manufacturing

If activists are serious about producing clean energy—or what they believe is clean energy—in the U.S., then they must recognize and support the key ingredients of a strong, innovation-driven manufacturing sector, which produces components for wind turbines, blackberrys, flat screen televisions, solar panels, advanced batteries, energy efficient lighting, and many other technologies.

First, certain "green technologies" depend on critical raw materials derived from "rare earth" mineral elements. Rare earth materials include "rare earth ores, oxides, metals, alloys, semi-finished rare earth products, and components containing rare earth materials," and are used in "a variety of commercial and military applications, such as cell phones, computer hard drives, and Department of Defense (DOD) precision-guided munitions."[78] For the most part, because of their unique physical and chemical properties, these minerals currently have no substitutes.

China produces about 97 percent percent of the world's supply of rare earth minerals, while the U.S. produces none. China's dominance has real-world consequences for the U.S. According to the Government Accountability Office:

> The United States previously performed all stages of the rare earth material supply chain, but now most rare earth materials processing is performed in China, giving it a dominant position that could affect worldwide supply and prices.[79]

The United Steel Workers, in its WTO challenge to China's subsidies for clean energy exports, noted that America's "last processing facility for such materials was purchased by the Chinese and its equipment shipped to China years ago." The steel workers claim that "China has clamped down on the export of rare earth minerals particularly hard of late, slashing its 2010 export quota for rare earth minerals by about half from the prior year."[80]

China's dominance in developing rare earth minerals provides enormous trade leverage over American and European manufacturers—and China is already flexing its trade muscles. According to news reports, German companies have complained of being "pressed by Chinese officials" to increase their investments in China "if they want to be assured of access to rare earth minerals…"[81]

Government policy should help reduce our dangerous dependence on China for rare earth minerals. That includes something anathema to environmentalists: increasing domestic rare earth mining. Dr. Roderik Eggert of the Colorado School of Mines has argued that "domestic production can help offset the risks associated with unreliable foreign sources." He has proposed implementing a balanced regulatory regime to facilitate construction of new mines:

> Developing a new mine in the United States appropriately requires a pre-production approval process…This process is costly and time consuming—arguably excessively so, not just for mines but for developments in all sectors of the economy. I am not suggesting that mines be given preferential treatment, rather that attention be

> focused on developing better ways to balance the various commercial, environmental, and social considerations of project development.[82]

Demand for rare earth minerals "vastly outpaces the limited or non-existent production" in the U.S.[83] Environmental activists, who claim to favor building a domestic clean energy manufacturing sector, face a stark choice. GAO found that rebuilding the rare earth supply chain in the U.S. could take up to 15 years. Securing the capital investment necessary to rebuild the industry will require, among other things, regulatory certainty. As Preston Rufe of Formation Capital testified before the Senate Energy and Natural Resources Committee, "uncertainties regarding policies towards mining can further hamper efforts to develop domestic sources."[84] Indeed, the favored tool of those groups—litigation blocking new mines—would strangle America's ability to produce hybrid batteries and other favored "green" technologies.

Keep Energy Costs Stable, Affordable

Along with the necessary materials, manufacturing needs stable and affordable energy costs. Yet cap-and-trade and renewable energy mandates—the favored policies of Friedman and green activists—are specifically designed to increase energy costs. Those increases restrict growth in manufacturing and undermine competitiveness. Even marginal increases in energy prices are bad for business. As the Industrial Energy Consumers wrote recently on federal renewable energy mandates:

> If we are to enable manufacturing to compete globally, and increase jobs and exports, we must not increase costs. For energy-intensive manufacturing companies, even a relatively small increase in the price of electricity may determine whether they can compete with foreign imports.

Cap-and-trade would not spur a green manufacturing revolution; rather, it would cut production and send jobs overseas. Consider the Kerry-Lieberman cap-and-trade bill, touted by Friedman and others. The American Council on Capital Formation and the Small Business and Entrepreneurship Council Industrial found that, if the bill became law, manufacturing "begins to decline immediately in 2013…under the Kerry-Lieberman bill." In 2030, U.S. industrial output levels "are reduced by between 4.9% and 5.8% under the low and high cost scenarios." The hardest hit industries, according to the study, are, among others, aluminum (down 40 percent) and steel (down 18 percent).

The employment impacts would be dire. The National Black Chamber of Commerce found that, under the Waxman-Markey cap-and-trade bill, so-called "green jobs" in renewable energy may increase. But that fails to tell the whole story:

> This study finds that even after accounting for green jobs, there is a substantial and long-term net reduction in total labor earnings and employment. This is the unintended but predictable consequence of investing to create a "green energy future."[85]

Conclusion

Thomas Friedman's vision of "green energy future" is marred by higher taxes, fewer jobs, more regulations, bigger

government subsidies, and a diminished, less competitive manufacturing sector.

The lament that America is losing the "clean energy race" to China is a mere pretext for imposing that statist vision on the American economy. China's command-and-control system offers alluring possibilities for those who oppose the free market. But a government-directed economy, as with those that preceded it, will fail the test of time.

China is winning the global economic race by embracing the reality that fossil fuels, along with nuclear power, will remain the dominant energy sources for the foreseeable future. They will be the engines of growth, and those that possess them, and use them responsibly, will lead the world in technological innovation and economic might. Policymakers in the U.S. must also embrace this reality—and resist the temptation that government mandates, taxes, and regulations are the pathway to America's economic resurgence.

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