Subject: Yale Environment 360: A Reality Check on the Pickens Energy Plan
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ANALYSIS

A Reality Check on the Pickens Energy Plan

Billionaire T. Boone Pickens has always been one to think big. But his sweeping 10-year energy plan for America faces obstacles that may be insurmountable.

BY VACLAV SMIL

For the past two months, it has been hard to avoid T. Boone Pickens, the 80-year-old Texas oilman, billionaire, and former corporate raider. First, he was all over the TV news introducing his grand, 10-year energy plan for America, which calls for massive construction of wind power turbines and powering many of the country's cars on natural gas. Then he testified before Congress, warning that the U.S.'s oil addiction — the nation spends $700 billion a year importing oil — amounted to the greatest transfer of wealth in the history of mankind. Soon he was back on TV with a $58 million advertising blitz to rally public support for his proposal, the Pickens Plan.

Ever the shrewd entrepreneur — Pickens is building the world's biggest wind farm in Texas and owns the country's largest network of natural gas filling stations — he framed the reasons for taking these radical steps in a concise and accurate manner: America's addiction to oil "threatens our economy, our environment and our national security...and it ties our hands as a nation and a people."

There is much to admire in the Pickens Plan, but its sheer grandiosity raises serious doubts as to whether it can be realized: It would require building more than 100,000 wind turbines, connecting them to large cities with at least 40,000 miles of transmission lines, and converting tens of millions of cars to natural gas fuel. To accomplish this within a decade would be a Herculean effort that simply may not be achievable.

Perhaps the greatest appeal of the Pickens Plan is its cascading simplicity. First, Pickens wants to dot the Great Plains ("the Saudi Arabia of wind power") with wind turbines to replace

Pickens Plan
Pickens' prime-time TV ads have been omnipresent in recent weeks, vying with political campaign ads for public attention.

all the electricity currently produced by burning natural gas. Second, he wants to use the natural gas freed by wind-powered generation to run efficient and clean natural gas vehicles. Third, he believes that this substitution will create a massive, new domestic aerospace-like industry — with well-paying jobs in the production of giant turbines and auxiliary equipment — that will bring economic revival to the depopulating Great Plains. Finally, Pickens says his plan would reduce the huge outflow of wealth to oil-producing nations as the U.S. cuts its oil imports by more than one-third.

If this were an opera, shouts of "Bravissimo!" would be in order. But despite its many positives, the timely realization of the Pickens Plan faces a number of extraordinary challenges, to say the least. The engineering and financial hurdles are daunting: Pickens proposes $1 trillion in private investment to build the wind turbines that will stretch from the Texas panhandle to the Canadian border and another $200 billion (a conservative estimate) to construct a new electric grid connecting this archipelago of wind farms to major cities. Indeed, his plan is so ambitious that he compares it to the construction of the Interstate Highway System in the 1950s.

Alas, that booming era in American history is long gone, and Pickens is proposing his plan in a country where the political system is gridlocked and the economic problems are deep. The realities of today's America — the state of its finances (huge deficits everywhere), the demise of its manufacturing (rising dependence on imports of all kind), and the devaluation of its currency — do not create an impression of a vigorous seeker of new paths; besides, addicts are not usually zealous agents of their own recovery, and addiction to imported oil is exceedingly strong.

So while I would love to see this grand Texan challenge succeed, America's dysfunctional leadership may yet prove its undoing. The plan would require some resolute federal and state legislative decisions. Yet how can we take seriously a Congress which, just two weeks after its members applauded the Pickens Plan, balked at extending the wind energy tax credits essential to the success of the project? Those credits expire at the end of the year. In addition, the plan would have to comply with a multitude of laws and regulations (from environmental assessments to complicated rights-of-way easements), and some of its components would certainly be challenged in the courts, delaying its completion. Pickens apparently appreciates that the plan can be taken seriously only if a well-organized media campaign puts serious political pressure on Congress and helps weaken the many federal and state regulatory obstacles.

However, unlike Al Gore's utterly unrealistic plan — which calls for entirely "re-powering" America in a decade by completely replacing the enormous fossil-fuel electricity infrastructure with renewable sources — the Pickens Plan sets out a challenging, but not impossible, technical goal. Gore's plan not only assumes an impossibly short timeline, but it also promises totally unrealistic, microchip-like declines in the cost of these new energy sources.

With Pickens' plan, the cost estimates are essentially correct as far as

today's prices go. But megaprojects extending over a decade tend to have serious cost overruns, thus Pickens' plan could cost twice as much as is now estimated.

Even more importantly, it is unclear if Pickens appreciates the many technical challenges that have to be solved to make the plan work, whether in one decade, as he has proposed, or in two or three decades. Or perhaps he understands the hurdles perfectly well but does not want to weaken the powerful message of the plan's benefits by acknowledging its looming challenges.

Pickens Plan

Pickens' plan sees wind power replacing natural gas as an electricity source, with natural gas being used to power cars in the U.S.

One of the biggest problems is his assumption that natural gas, which now generates about 22 percent of U.S. electricity, can be handily replaced by wind power. In America today, baseline power production is met by coal-fired stations and nuclear plants, which, respectively, work 70 percent and 90 percent of the time delivering electricity into the grid. Natural-gas power plants operate, on average, only 21 percent of the time, meeting peak demand on hot summer days and cold winter nights.

Under Pickens' plan, wind turbines would produce the same amount of electricity — 22 percent — as natural gas currently does. But wind is a fickle source of power, so to be available on demand — as natural gas now is — considerably more turbines would have to be constructed than envisioned in his plan. Only detailed simulations of generation and consumption patterns could determine the actual number of turbines, their optimal locations, and the requisite high-voltage (HV) interconnections needed to substitute one form of generation for another — and no such simulations have been done.

Pickens' projections about how many new turbines will be needed under his plan, as well as the rate of constructing new transmission lines, also are highly optimistic. In 2007, U.S. utilities installed about 3,200 turbines with a total generating capacity of 5.24 gigawatts of electricity: If these turbines were to generate electricity 25 percent of the time — a typical load factor — they would produce enough electricity for about one million households for a year. (The U.S. has more than 110 million households.) But even if today's natural gas-fired power plant capacity were replaced at an unrealistic 1:1 ratio by wind turbines, Pickens is talking about installing 40 gigawatts of wind power a year — roughly 8 times the 2007 pace. And even if the turbines were to average 3 megawatts (larger than today's mean), some 130,000 of them would be needed. With determination and ample financing, that is a plausible pace.

But the Pickens Plan also estimates spending $200 billion for building new high-voltage (HV) transmission links to carry electricity from the Great Plains to the coasts. Recent construction costs of HV lines have ranged from less than $2 million per mile to more than $5 million per mile; the latter rate would get America about 40,000 miles of new HV connections. Without knowing the specifics, which Pickens' plan do not address, this may or may not be enough to link nearly 400 gigawatts of newly installed

wind-generating capacity in the Dakotas, Nebraska, Kansas, Oklahoma, and Texas with high urban concentrations on the coasts. In any case, the construction pace would be a huge challenge. During the 1990s, U.S. utilities built about 9,700 miles of new HV lines and plans for this decade amount to less than 8,000 miles — one-fifth to one-sixth of the 40,000 to 50,000 miles required under the Pickens plan.

And then there is the switch to natural gas vehicles. While they are efficient, clean, and entirely desirable (I had advocated their use as far back as the first oil "crisis" of 1973), scaling of their ownership to tens of millions units, from fewer than 200,000 such cars today, would be extremely difficult to do in a single decade — and only a few of America's nearly 120,000 service stations now offer natural gas. Unfortunately, America also is increasingly an importer of natural gas (buying 18 percent of total global consumption in 2007). And natural gas prices follow those of crude oil, a reality that could reduce the plan's eventual impact on the trade deficit — and sharply reducing this wealth transfer is one of Pickens' major goals.

Finally, a sobering thought about the efficacy of the Pickens Plan to prevent the massive wealth transfer that the Texan rightly abhors. If oil prices were to stabilize at the level prevailing in mid-August 2008, then Middle Eastern exporters will end up earning nearly one trillion dollars for their heavy, sulfurous crudes in 2008. Unchanged or growing oil imports, with prices staying well above $100 per barrel, would translate to an outflow of some $10 trillion in a decade. But even if the Pickens plan were to reduce that by more than a third, the country would still be running a huge trade deficit that precludes the re-emergence of a strong dollar: Given America's large budget deficit and more than $40 trillion of assorted debts and uncovered obligations, even a perfect realization of the Pickens Plan would still leave the U.S. on a weakening economic trajectory.

The Texas oilman is right: This is a crisis of America's own making. Federal mileage standards doubled America's passenger car fuel efficiency between 1976 and 1986, to 27.5 mpg. But with the ensuing decades of inexpensive oil, no new standards were set. A mere continuation of the 1976-1986 rate of improvement would have meant that American cars today would average close to 50 mpg, eliminating the need for nearly 70 percent of the crude oil we import. Moreover, a massive adoption of SUVs pushed the passenger vehicle fleet performance to just 22 mpg by 2006. And if America hopes to make up for its gasoline profligacy with more drilling, that will not prove to be effective solution: More oil will be discovered in America's offshore waters, but not nearly enough to make the country self-sufficient, even after two to three decades of such activity.

Unfortunately, nothing — and certainly not the Pickens Plan — offers an effective technical fix in just a decade. America's per capita energy consumption remains twice as high as the European Union's and Japan's. The era of Americans driving two SUVs to 5,000-square-foot houses 50 miles from city centers may be over. But for the U.S., even more radical, protracted and very painful adjustments will be needed to cure the nation's most incapacitating addiction.

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