



Natural gas should be used to power plug-in cars, while wind energy replaces dirty coal.

## Picking a Clean Energy Plan: NRDC's "Plug-in Alternative" Is More Efficient than the Pickens Plan

From oil price volatility to global warming and national security concerns, it is clear that our current reliance on oil is unsustainable. Even oil industry veteran T. Boone Pickens has proposed a plan (the "Pickens Plan") to rapidly reduce oil dependency by increasing wind power and using natural gas to power vehicles. NRDC agrees with the urgency behind the Pickens Plan and supports the broad expansion of clean, renewable electricity. But the Pickens Plan does not contemplate the full range of options. We believe that pursuing the best outcome rather than preselected technologies will reveal more effective ways to put our natural gas resources to work. As one example, we examine here an alternative proposal, "The Plug-in Alternative," that would get the most mileage out of our renewable and clean-burning energy sources while sharply reducing our dependence on dirtier sources like oil and coal.

### Pickens Plan Gets Wind Power Right But Uses Natural Gas Inefficiently

The Pickens Plan calls for:

- Replacing all the natural gas in the power sector within 10 years by rapidly scaling up wind power.<sup>1</sup>
- Using the natural gas replaced by wind power as fuel for car and truck engines, in place of conventional oil.

The Pickens Plan estimates that it can generate 22 percent of U.S. electricity with wind power and displace about one-third of our oil imports with natural gas. NRDC estimates that the Pickens Plan could reduce oil consumption by 4.9 million barrels per day (Mbd). Additionally, using cleaner burning natural gas in vehicles could reduce global warming pollution by 156 million metric tons per year.

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Impressive though these reductions are, burning natural gas directly in car and truck engines is very inefficient. It is more efficient to use the same natural gas to produce electricity to charge plug-in hybrid electric vehicles (known as PHEVs). And because natural gas is the cleanest-burning fossil fuel, using natural gas and wind power to displace dirty coal power plants results in greater overall reductions of smog, soot, and global warming pollution.



*Reducing coal as part of a clean transportation effort can reduce almost three times the global warming pollution as the Pickens Plan.*

### NRDC's Plug-In Alternative: Using Natural Gas to Power Plug-in Hybrid Electric Vehicles

One better way to put natural gas to work powering the clean energy economy is to use it to make electricity that can power the next generation of plug-in hybrid electric vehicles. PHEVs are roughly 40 percent more energy efficient than natural gas-powered vehicles. For the same amount of natural gas, plug-ins can save 40 percent more oil and reduce three to four times more global warming pollution.

### NRDC's Plug-In Alternative Plan Does More to Clean Up the Grid and Reduce Global Warming Pollution

Our Plug-in Alternative plan and the Pickens Plan call for similar expansions in renewable electricity production and increases in demand for natural gas. The key difference is that the Plug-in Alternative uses natural gas first—and more efficiently—to generate electricity to power as many plug-in hybrids as possible. Using the same renewable energy production target as the Pickens Plan, our alternative uses 70 percent of natural gas for electricity to charge plug-in hybrid electric vehicles and to displace dirty coal-powered power plants. The remaining 30 percent is used directly in medium and heavy-duty trucks.

NRDC's Plug-in Alternative provides similar oil savings but significantly more global warming pollution reduction. As shown in Table 1, the Plug-in Alternative provides slightly higher oil savings (5.0 Mbd versus 4.9 Mbd). However, it produces significantly more global warming pollution reductions (450 MMT CO<sub>2</sub>e versus 156 MMT CO<sub>2</sub>e) than the Pickens Plan.

Replacing coal with natural gas can cut global warming pollution by about half for each kilowatt hour produced. Thus, reducing coal as part of a clean transportation effort can reduce almost three times the global warming pollution as the Pickens Plan. Conversely, eliminating natural gas use in the electricity sector (as the Pickens Plan proposes) would create more pressure to continue, or possibly expand, reliance on coal and nuclear power.

Given the difficulty of reducing global warming pollution—especially in the transportation sector—it is critical that America's policies maximize CO<sub>2</sub> reductions.

**Table 1. Comparison of the Benefits of Pickens Plan and NRDC's Plug-in Alternative**

	Pickens Plan	NRDC's Plug-in Alternative
Global warming pollution savings in 2020 (MMT CO <sub>2</sub> e / year) <sup>a</sup>	156	450 (2.9 times greater)
Oil savings in 2020 (Mbd) <sup>b</sup>	4.9	5.0

<sup>a</sup> For 2020, we assume an average thermal efficiency of 40% for U.S. natural gas plants based on Energy Information Administration's Annual Energy Outlook 2008. We use GREET 1.8b emissions factors for electricity from natural gas fired plants and coal fired plants. These estimates are conservative. Emissions savings and oil savings would be even greater had we assumed higher market penetration of efficient generating technologies. A new natural gas combined cycle plant is about 49% efficient. Even higher efficiencies can be obtained through distributed high temperature fuel cells coupled with exhaust capturing microturbines which can achieve efficiencies of 70%. Similarly, carbon displacement could be higher if natural gas deployment was optimized to support renewable electricity from a range of resources.

<sup>b</sup> Each case assumes direct natural gas use in medium and heavy-duty vehicles. We assume that natural gas vehicles achieve the same fuel economy as conventional gasoline vehicles. We further assume that plug-in electric vehicles operating on electricity are 3.5 times more efficient in converting the energy on board the vehicle than conventional gasoline vehicles.