

5 STEPS AWAY FROM 5 BILLION BARRELS

Our dependence on oil is an unsustainable economic, national security, and environmental burden. The U.S. consumes 7.5 billion barrels of oil annually. Foreign sources supply two thirds of our consumption. Under a business-as-usual scenario, by 2030 we will have to import up to 80% of the 11 billion barrels that will be needed to fuel our economy.

This increasing dependence is already very costly. Oil and gas imports account for \$300 billion, or 40% of our trade deficit. Furthermore, we tax ourselves to pay interest on the loans that other countries graciously extend to finance our energy deficit. By the same token, Middle East oil exporters added \$280 billion in current account surpluses to their dollar assets last year.

Oil revenue wealth enables suppliers such as Russia, Saudi Arabia, and Venezuela use their reserves as a strategic leverage to undermine our geopolitical influence in their respective regions. Our national security is further threatened by a perfect price storm that is gathering as global oil resources deplete, global demand grows, the concentration of supplies shifts away from the West and international oil companies, and the oil market retreats under the pressure of resource nationalism and mercantilism.

Finally, it is imperative that we wean ourselves off the resource that contributes the most to global warming if we are to lead the world in averting the threat that significant climate change poses to human civilization.

The energy trilemma we face is daunting. Yet we have the technological wherewithal to mitigate our energy vulnerability via the deployment of greater energy efficiency, renewable sources of energy, nuclear power, enhanced oil recovery, and clean coal. Following is an outline of the five resources that we can exploit to diversify our energy portfolio by 2030 and displace more than double the five billion barrels of oil that we import.

1. EFFICIENCY:

3.7 bb

Efficiency gains are the largest, cheapest, and most accessible energy resource. Our total energy use per dollar of GDP has halved since the 1970s, but is still double that of Japan. Forty percent of the energy, and two thirds of the fossil fuels, that we use are lost as waste heat. The building and transportation sectors, which account for two thirds of our energy use, offer the greatest savings potential.

A. Green Building

2.2 bb

Commercial and residential buildings consume two thirds of our electricity and account for more carbon emissions than any other sector. A series of small changes could make a big difference. For example, technologies available today could increase the efficiency of appliances by 33% over the next decade and eliminate vampire appliances (the average household has 20). A simple change in the color of a home's roof from black to white can save as much electricity as solar panels would generate,

while a complete phase-out of the incandescent light bulb could save the energy equivalent of 80 coal plants and spare consumers \$18 billion a year in electricity bills.

B. Fuel Economy

1.5 bb

On average, due to low fuel economy standards, Americans use over a third more gasoline than Europeans to drive a mile. Every mile-per-gallon improvement in CAFE standards would eliminate the need for 350,000 barrels in oil imports. So raising the fuel economy of our car and truck fleets by 20 miles/gallon over 20 years would save us more than the amount of oil we currently import from the Persian Gulf. Meanwhile, integrating composite materials, more efficient batteries, flex-fuel capability, and plug-in technology into hybrids, could yield a car that runs on 1000 miles per gallon of gasoline.

2. RENEWABLES:

3.5 bb

A. Biofuels

1.5 bb

Biofuels are our only renewable alternative to oil in the transportation sector. The DOE and USDA concluded in a recent report that the U.S. is capable of producing a sustainable supply of 1.3 billion tons of feedstock per year – enough biomass to make 3.5 billion barrels of oil equivalent. Many of the concerns raised about corn ethanol could be addressed with a transition to cellulosic biobutanol. The latter's advantages include a higher energy content, negative carbon emissions, compatibility with existing pipelines, and potential competitiveness with oil by 2030. Cellulosic biofuels also have the advantage of being derived from abundant and varied feedstock that does not compete with food and that can grow on marginal land with little chemical and water input.

B. Wind

0.5 bb

The wind resources of Kansas, South Dakota, and Texas alone could meet all of the country's electricity needs. So could offshore wind resources. One fourth of U.S. territory has winds powerful enough to generate electricity as cheaply as coal.

C. Hydro and Marine

0.5 bb

Whereas traditional hydropower can be environmentally disruptive, new micro-scale systems eschew controversy by employing run-of-river designs that divert only part of a water stream. Meanwhile, marine power harnesses energy from tide changes, ocean currents and waves. The Electric Power Research Institute estimates that coastal states could produce 2,3 trillion kWh from near-shore marine resources alone.

D. Geothermal

0.5 bb

Geothermal power has the lowest carbon footprint, land and freshwater requirements of all renewables. It also has the ability to provide baseload electric power.

A DOE and MIT panel estimated in 2005 that Enhanced Geothermal Systems could extract 2,000 times our annual primary energy consumption.

E. Solar

0.5 bb

Falling prices and revving technological innovation continue to bolster the position of solar power as the world's fastest growing renewable energy resource. A mere 1.6% of U.S. land, covered with solar cells, could supply all of the country's current energy needs.

3. NUCLEAR:

1 bb

The U.S. is already the largest producer of nuclear energy in the world. Although no new nuclear plant has been built since Three Mile Island, existing plants have tripled power production by adding reactors and improving efficiency. Public opinion is supportive, albeit "nimby" due to security and waste concerns. Yet nuclear power offers the highest energy density from any source and produces no CO₂ emissions. It has also technologically matured in the past few decades. New pebble-bed reactors, for example, have lower up-front capital costs, cannot meltdown, and are less susceptible to some nuclear proliferation risks. Meanwhile, the fast reactor, which is still at the experimental stage, might eliminate the waste problem altogether. Many of the stumbling blocks to nuclear power development – permitting, siting, and waste disposal – are political. One need only look to France, where 80% of electricity needs are met with nuclear, to see that supportive public policy can make a big difference.

4. EOR:

1bb

Primary and secondary oil production phases can recover from 10 to 40 percent of a reservoir's resources. Enhanced Oil Recovery can recover over 60 percent of the oil by injecting CO₂ into stranded wells. The CO₂ may then be sequestered in empty wells and sealed with impermeable cap rock. According to the DOE, the U.S. could recover an additional 47 billion barrels of oil from existing wells by using EOR.

5. CLEAN COAL:

1bb

Coal currently supplies 50% of our electricity needs. And the U.S. still has 275 billion tons of recoverable coal – as much energy as the rest of the world has in oil. Furthermore, coal can be converted, via the Fischer-Tropsch process, into clean-burning methane that could be blended or interchanged with conventional diesel fuels. If we are serious about tackling climate change, however, we cannot fully capitalize on this cheap and abundant resource unless we also implement carbon capture and sequestration (CCS). The technology is available and has already been successfully deployed at two gas fields and an EOR site in, respectively, Norway, Algeria, and Canada. A carbon tax would make CCS economically viable, which in turn would make coal-to-liquid fuels more environmentally palatable.

Over the past thirty years, the U.S. has transferred \$1.16 trillion to oil-producing nations. In the process, we have supported corrupt regimes that funnel money to the same terrorist groups we have spent billions more dollars fighting. Over the next thirty years, we can transform our Achilles heel into a source of economic, environmental, and national security strength by investing that \$1 trillion here. To this end, the government needs to prioritize energy security, provide long-term support for innovation while maintaining technology neutrality, and level the energy playing field by forcing the market to internalize the real cost of oil. By achieving a sustainable diversification of our energy portfolio, we will reduce our energy imports and improve our trade deficit by exporting clean technologies. Not only will we regain global leadership and credibility by cutting our carbon emissions from oil, but we will also ameliorate our environment and public health. And we will finally liberate our foreign policy by removing the strategic leverage that oil suppliers have over us, while we decrease our vulnerability to attack on critical infrastructure by creating a decentralized energy grid. We have all the tools that we need to make this vision a reality and shrink our deficit, carbon emissions, and insecurity while creating a great opportunity for U.S. manufacturers, farmers, and workers.

