

We all live on a steady and often overindulgent diet of energy. Disconnection with the consequences of our consumption, in part, has led us to a state of emergency. Ignoring our role in the energy crisis is no longer an option. The good news is solutions abound. According to Dr. Makhijani, a Carbon-Free and Nuclear-Free energy sector is possible by 2050. To be vigilant consumers we must promote the integrated viable solutions, like those posed by Dr. Makhijani, and refuse to settle for the band aids being ushered through our political systems. We must press our elected officials to implement the necessary policies to suppress further development of dirty energy, while simultaneously, promoting renewable energy industries and robust efficiency standards. It is time to replace our carbon and nuclear laden energy diet with a heaping dose of clean and sustainable energy.

If one were to scan the daily news they would likely be confronted with discouraging accounts of global warming, burgeoning nuclear programs, and the war in Iraq. One might not recognize the connectivity between these issues, but in fact, their convergence is the basis of our current energy crisis.

A Three-fold Energy Crisis:

Climate disruption: Carbon dioxide (CO₂) emissions due to fossil fuel combustion are the main anthropogenic cause of severe climate disruption, whose continuation portends grievous, irreparable harm to the global economy, society, and current ecosystems.

Insecurity of oil supply: Rapid increases in global oil consumption and conflict in and about oil exporting regions make prices volatile and supplies insecure.

Nuclear proliferation: Non-proliferation of nuclear weapons is being undermined in part by the spread of commercial nuclear power technology, which is being put forth as a major solution for reducing CO₂ emissions.



When it Comes to Energy: We Have a Choice

Can We Solve It? YES!

The overarching finding of the **Carbon-Free and Nuclear-Free** study is that a zero-CO₂ U.S. economy can be achieved within the next thirty to fifty years without the use of nuclear power and without acquiring carbon credits from other countries. In other words, actual physical emissions of CO₂ from the energy sector can be eliminated with technologies that are now available or foreseeable. This can be done at reasonable cost while creating a much more secure energy supply than at present. Net U.S. oil imports can be eliminated in about 25 years. All three insecurities – severe climate disruption, oil supply and price insecurity, and nuclear proliferation via commercial nuclear energy – will thereby be addressed. In addition, there will be large ancillary health benefits from the elimination of most regional and local air pollution, such as high ozone and particulate levels in cities, which is due to fossil fuel combustion.

A zero-CO₂ U.S. economy without nuclear power is not only achievable – it is necessary for environmental protection and security. Even the process of the United States setting a goal of a zero-CO₂, nuclear-free economy and taking initial firm steps towards it will transform global energy politics in the immediate future and establish the United States as a country that leads by example rather than one that preaches temperance from a barstool. The achievement will require unprecedented foresight and coordination in policies from the local to the national, across all sectors of the energy system.

Here Is How: The Clean Dozen

The 12 most critical policies that need to be enacted as urgently as possible for achieving a zero-CO₂ economy without nuclear power are as follows.

1. Enact a **physical limit of CO₂ emissions for all large users of fossil fuels** (a “hard cap”) that steadily declines to zero prior to 2060, with the

time schedule being assessed periodically for tightening according to climate, technological, and economic developments. The cap should be set at the level of some year prior to 2007, so that early implementers of CO2 reductions benefit from the setting of the cap. Emission allowances would be sold by the U.S. government for use in the United States only. There would be no free allowances, no offsets and no international sale or purchase of CO2 allowances. The estimated revenues – approximately \$30 to \$50 billion per year – would be used for demonstration plants, research and development, and worker and community transition.

A goal of a zero-CO2 economy is necessary to minimize harm related to climate change. A hard cap on CO2 emissions -- that is, a fixed emissions limit that declines year by year until it reaches zero – would provide large users of fossil fuels with a flexible way to phase out CO2 emissions. However, free allowances, offsets that permit emissions by third party reductions, or international trading of allowances, notably with developing countries that have no CO2 cap, would undermine and defeat the purpose of the system. A measurement-based physical limit, with appropriate enforcement, should be put into place.

2. **Eliminate all subsidies and tax breaks for fossil fuels and nuclear power** (including guarantees for nuclear waste disposal from new power plants, loan guarantees, and subsidized insurance).
3. **Build demonstration plants for key supply technologies, including central station solar thermal with heat storage, large- and intermediate-scale solar photovoltaics, and CO2 capture in microalgae for liquid fuel production.**
4. **Ban new coal-fired power plants** that do not have carbon storage.

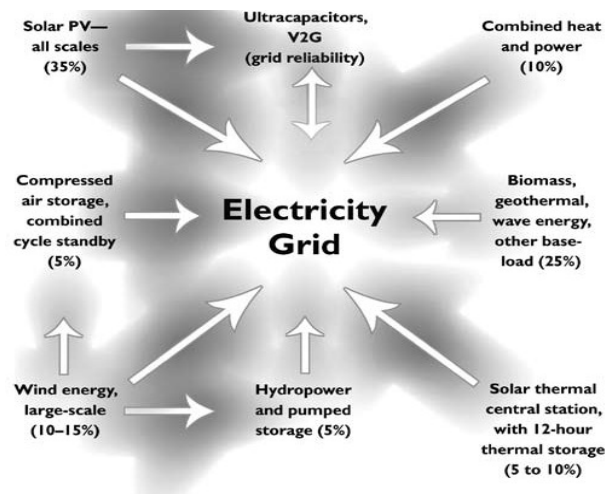
A reliable U.S. electricity sector with zero-CO2 emissions can be achieved without the use of nuclear power or fossil fuels. The use of nuclear power entails risks of nuclear proliferation, terrorism, and serious accidents. It exacerbates the problem of nuclear waste and perpetuates vulnerabilities and insecurities in the energy systems that are avoidable.

5. **Eliminate subsidies for biofuels** from food crops

Biofuels, broadly defined, could be crucial to the transition to a zero-CO2 economy without serious environmental side effects or, alternatively, they could produce considerable collateral damage or even be very harmful to the environment and increase greenhouse gas emissions. The outcome will depend essentially on policy choices, incentives, and research and development, both public and private.

References:

This is a selection of excerpts from the official Executive Summary of the book *Carbon-Free Nuclear-Free: A Roadmap for U.S. Energy Policy* authored by Arjun Makhijani, Ph.D. and published in October 2007 by RDR Books.



One possible future U.S. electricity grid configuration without coal or nuclear power in the year 2050

6. Leverage federal, state and local purchasing power to **create markets for critical advanced technologies, including plug-in hybrids.**
7. Enact at the federal level **high efficiency standards for appliances.**
8. Enact **stringent building efficiency standards** at the state and local levels, with federal incentives to adopt them.
9. Enact **stringent efficiency standards for vehicles and make plug-in hybrids the standard U.S. government vehicle by 2015.**

The use of highly efficient energy technologies and building design, generally available today, can greatly ease the transition to a zero-CO2 economy and reduce its cost. A two percent annual increase in efficiency per unit of Gross Domestic Product relative to recent trends would result in a one percent decline in energy use per year, while providing three percent GDP annual growth. This is well within the capacity of available technological performance.

10. Put in place federal contracting procedures to **reward early adopters of CO2 reductions.**
11. **Adopt vigorous research, development, and pilot plant construction programs for technologies that could accelerate the elimination of CO2, such as direct solar hydrogen production (photosynthetic, photo electrochemical, and other approaches), hot rock geothermal power, and integrated gasification combined cycle plants using biomass with a capacity to sequester the CO2.**
12. **Establish a standing committee on Energy and Climate** under the U.S. Environmental Protection Agency's Science Advisory Board.

The transition to a zero-CO2 system can be made in a manner compatible with local economic development in areas that now produce fossil fuels.