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The Cheney Energy Plan: Technically Unsound and Unsustainable

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In May 2001, a task force led by United States Vice-president Dick Cheney issued a report entitled *National Energy Policy: Report of the National Energy Policy Development Group*. An alternative title is provided inside: *Reliable, Affordable, Environmentally Sound Energy for America's Future*. The report is often called the Cheney Plan for short. It has unleashed a flood of debate on energy policy questions. This debate has been needed for some time for a number of reasons:

- U.S. emissions of carbon dioxide, the principal greenhouse gas, are at record highs and rising, in contrast to those of the European Union and, in recent years, even China.
- The rising world demand for oil and growing U.S. oil imports are occurring in the context of a renewed political-military crisis in the Middle East, both as regards Israel-Palestine and Iraq. There is also an emerging competition between the United States, Russia, and possibly China over the oil and gas resources of the Caspian-Central Asian region (including Iran)[2]. The U.S. imports about 55 percent of its oil requirements. At about 11 million barrels a day imports, it is, by far, the world's largest oil importer.
- Utility deregulation has produced chaotic conditions, including electricity prices in California, that were literally unthinkable at the start of the year 2000. The highest reported price was $3,880 per megawatt-hour. That is almost 40 times the peak price of about $100 per megawatt-hour considered appropriate as the upper limit for peak electricity power charges prior to deregulation. Even at the extremely high price of natural gas at $10 per million Btu, which prevailed briefly last winter (it is just over $3 at the time of this writing, July 2001, and was $2 in early 2000), a reasonable maximum price of peaking power would be about $200 per megawatt-hour. A good deal of peaking power can be generated for much less.

While the Cheney Plan devotes a substantial proportion of its pages to renewable energy sources, efficiency, equity, and environment, the recommended actions in these areas are minor, and place all of these issues at the margins of energy policy. Reduction of emissions of carbon dioxide is not a part of the plan, which mentions voluntary measures by corporations in this regard. The National Energy Policy does not mention the Kyoto Protocol, the international treaty to reduce greenhouse gas emissions,[3] which the United States has signed but which the Bush administration has rejected. The United States is responsible for about 25 percent of the world's

greenhouse gases.

The central focus of the plan (to be found in Chapter 5) is increasing energy supply using coal, oil, gas, and nuclear energy. Complementing that supply focus, in the related chapters 7 and 8, are infrastructure developments and foreign policy measures. The following are some of the practical highlights of the National Energy Policy:

- *Oil and natural gas*: The proposed policy would (i) open up federal lands to drilling for oil and gas, notably by reducing "restrictions" currently placed on such drilling; (ii) open a part of the Alaska National Wildlife Refuge (ANWR) for oil and gas drilling (the U.S. Geological Survey estimates oil reserves there to be between 5 and 15 billion barrels of oil); (iii) encourage drilling in offshore Arctic areas off Alaska; (iv) consider measures for reducing "risk associated with production [of oil and gas] in frontier areas," and "incentives" such as reduction of royalty payments to the government from new offshore oil and gas production; (v) promote "enhanced oil and gas recovery from existing wells through new technology."
- *Coal*: The proposed policy would provide $2 billion for research on clean coal technologies and "provide regulatory certainty" that would make it easier to invest in coal burning for electricity generation. This appears to be an implicit reference to potential regulations on carbon dioxide emissions that have been a source of concern to the coal industry.
- *Nuclear power*: The proposed policy would "support the expansion of nuclear energy in the United States as a major component of our national energy policy." This support would include (i) easier re-licensing of existing nuclear power plants beyond their design lifetimes, (ii) encouragement of new nuclear power plants at existing nuclear power plant sites, possibly without any new environmental impact statement process, (iii) encouragement of research in a new form of reprocessing called pyroprocessing, in order to promote development of "advanced nuclear fuel cycles and next generation technologies for nuclear energy" (p. 5-17). This is an implicit reference to the Integral Fast Reactor, which is a sodium-cooled breeder reactor with a pyroprocessing plant attached to it. The plan also advocates foreign collaboration on commercial nuclear fuel reprocessing, with countries such as France. The nuclear energy part of Chapter 5 also states that a new reactor type called the Pebble Bed Modular Reactor has "inherent safety features" (p. 5-16), but does not mention any of its safety vulnerabilities. (An article discussing PBMRs is available from IEER upon request.)
- *Electric power plants*: The plan advocates that the United States should build between 1,300 and 1,900 new electric power plants by the year 2020 based on projected demand. (The standard power plant size assumed appears to be 300 megawatts.)
- *Infrastructure*: New natural gas and electricity transmission lines would be encouraged by granting rights of way on federal lands and by new "legislation to grant rights-of-way for electricity transmission lines, with the goal of creating a national transmission grid." This would create federal power to acquire land for interstate commerce on a basis similar to current law for natural gas pipelines (pp. 7-7 and 7-8).

One overall provision would tilt the entire federal decision-making process towards energy supply. In the supply measures portion of the summary, the plan recommends that the president

"[i]ssue an executive order directing all federal agencies to include in any regulatory action that could significantly and adversely affect energy supplies a detailed statement on the energy impact of the proposed action." (p. xiv). For example, if a new national park is to be created, then its energy impact will have to be examined. There is no corresponding provision on the energy demand, or efficiency, side of the equation.

The plan falls far short in regard to renewables, efficiency, distributed grids, and decentralized combined generation of heat and electricity (called cogeneration, which is often far more efficient than producing heat and electricity separately), even though these measures could increase energy efficiency by the criterion of the second law of thermodynamics. (For a description, see the accompanying document, titled "Second Law of Thermodynamics.") For instance, while the Cheney plan goes into detail about reducing regulatory and institutional blocks for oil, gas, and nuclear energy, it does not make a single recommendation in this regard for distributed grids. It completely ignores an excellent study produced by the National Renewable Energy Laboratory of the Department of Energy, published in July 2000,[4] which provides extensive documentation of such regulatory and institutional barriers to cogeneration, renewable energy generation, and other decentralized power plants that would fit into distributed grids. The resistance of major power generating companies to such projects, expressed in the form of unreasonable charges for backup power supply for instance, continues to be a major problem, as it has been for decades.

The Cheney Plan would provide tax credits and subsidies for certain efficiency improvements and renewable energy sources. It would:

- Enact new legislation to provide a tax credit for cogeneration.
- Continue the 1.7 cents per kilowatt-hour subsidy for wind-generated electricity.
- Provide a tax credit for hybrid cars and fuel cell cars, both of which are more efficient than standard gasoline vehicles. Hybrid cars, which use gasoline as a fuel, run part of the time on batteries charged by energy recovered, for instance, during braking.
- Allocate $1.2 billion of the money that the U.S. government would get from leasing ANWR to oil companies toward research and development funds for renewables. This money would not be available if ANWR is not leased.
- Provide some modest tax breaks and credits in other areas, such as solar energy.
- Continue certain information programs to encourage greater energy efficiency and use of renewable energy sources.

The plan also recommends that the Secretary of Transportation recommend whether and what mileage standards for vehicles (known as Corporate Average Fuel Efficiency, or CAFE, standards) might be established after taking into account a new study by the National Academy of Sciences. The study, released on July 31, 2001, suggested a number of measures to increase efficiency standards but made no firm recommendations.[5]

The CAFE standard for passenger cars is currently 27.5 miles per gallon (mpg) and has not been tightened since model year 1985,[6] even though gasoline fueled cars using hybrid technology that get 60 mpg are now commercially available. Diesel hybrids can reach up to 100 mpg with current technology. The CAFE standard for light trucks (a category that includes sport utility

vehicles, cargo vans, minivans, and pickups) has increased only gradually since the mid-1980s and is now only 20.7 miles per gallon.

Overall evaluation of the plan

The most notable accomplishment of the plan is that it has made energy into a central topic of national discussion at a time when such debate is urgently needed. The topic has been sorely neglected on a bipartisan basis for the last two decades. But the substance of the plan is technically unsound and unsustainable. It neglects the fact that the energy system consists of complex interactions between the aspects of supply, distribution, conversion (from fuel to electricity), and utilization system. It would considerably increase carbon dioxide emissions, when large decreases are needed.

Specifically, the plan takes no account of the fact that the efficiency of energy use in the United States is still very low, despite some improvement over the past 25 years. By measures related to the second law of thermodynamics, the efficiency of many parts of the energy system, such as lighting and heating, and cars and sport utility vehicles (if just the human loads are taken into account), is in the one to ten percent range.

Some criteria by which to evaluate the Cheney Plan or any other energy plan are shown below.[7]

Sustainable Energy System Criteria

The following criteria, if met simultaneously, could result in an environmentally sustainable and economically viable energy system for the United States.

1. It must be reliable.
2. Its cost should be reasonable.
3. It should not produce routine severe pollution.
4. It should be possible to almost wholly confine the environmental and security costs of the energy system to the generations benefiting from it. In other words the system should be amenable to cost internalization.
5. Its core functions should be resilient to supply, transportation, transmission, and economic shocks.
6. It should not add matter or energy flows to natural systems to an extent that is comparable to pre-existing natural levels, or large-scale fluctuations in those levels.

It is difficult to match the last three criteria, as a group, to the first three. For instance, nuclear energy creates large quantities of plutonium and relies on reactors that can have catastrophic accidents that would pollute the land for uncounted generations. As another example, the present global energy system emits more than 6 billion metric tons of carbon (in the form of carbon dioxide to the atmosphere), but the natural absorption capacity is about half that. Both these systems fail the sustainability test.

Currently, the world's reliance on the Persian Gulf region has created a vulnerability to shocks and is also unsustainable. The region has been a major flash point for global conflict for over half a century and remains so. The addition of the Caspian region to this mix, which is also part of

U.S. oil policy, will not alleviate the problem, but rather introduce nuclear weapons into the mix, due to the added potential for U.S.-Russian confrontation.

Recently, the U.S. energy system, which had historically met the first two criteria - reliability and reasonable cost - seems increasingly unable to do so, as witness the wild swings in natural gas prices and the extremely unreasonable electricity prices that most Californians have had to pay over the past year.

The Cheney Plan will not solve these major problems. For instance, creating a national electricity grid to facilitate the transmission of electricity by large-scale generators will not necessarily address reliability problems and may aggravate them. Low reliability arising from a lack of reserve capacity was the main reason for the power problems in California. Deregulation created a situation in which power producers had no responsibility to maintain reserve capacity, and the regulators had no resources to do so either.

A completely unfettered electricity generation sector that has no responsibility for transmission or for reserve capacity would increase costs and be prone to unanticipated breakdowns. It would also increase transmission losses and will likely be less energy efficient. Reliability requires that large-scale private (and public) power producers have a responsibility for providing or paying for the maintenance of reserve capacity and for channeling power along efficient, relatively predictable routes. A free-for-all in generation on a large scale, across the continental United States, is a recipe for continued economic and technical problems. The Cheney Plan does not propose to impose any rules of good behavior on large-scale generators. Therefore, it is unlikely to create a reliable system that will have reasonable and predictable costs. Transmission capacity and location, reserve capacity, and the consuming system need to be coordinated with generation in order to get a reliable system overall.

It would be far better to mix small-scale plants that are close to the consumer or are on the consumer's premises and interconnect them to regional grids, which also have large-scale plants on them. Such systems are called distributed grids. These can be connected to regional grid systems, which already exist and only need modest improvement, as for instance between southern and northern California. Such a system of regional hybrid grids can be joined with regional renewable energy sources on a large scale. It would be far more reliable and environmentally sound than creating a national grid.

The Cheney plan opens up the questions of resuming reprocessing, establishing plutonium-fuelled reactors, and building new reactors in the United States after a hiatus of a quarter of a century. Reprocessing and plutonium fuelled reactors would throw overboard, without serious national debate, non-proliferation policy that has been sustained on a bipartisan basis through five presidents.

Moreover, nuclear energy is a poor choice for the future for reasons that have been discussed at length in IEER publications and prior newsletters. For instance, in *Science for Democratic Action* vol. 6 no. 3 (March 1998), IEER published a comparison between nuclear power and natural gas as ways of reducing greenhouse gases by replacing coal-fired power plants. This comparison shows that moderate natural gas prices and an adequate natural gas supply are

important in the transition period to a long-term sustainable energy system based only on renewable energy sources. Hence considerable increases in the efficiency of natural gas are essential. It is also likely that some added production of natural gas will be required. This can come from (i) a reduction of natural gas flaring abroad and imports of liquid natural gas, (ii) added domestic production from wells not associated with petroleum, and (iii) added imports from Canada and Mexico.

The Cheney Plan would greatly increase oil drilling, but it would not effectively address oil supply vulnerabilities. Even if all potential new reserves that are now economical at about 15 dollars a barrel of oil are added to USA reserves, U.S. oil reserves would remain well under 50 billion barrels (current proven reserves are 21 billion barrels and ANWR may add at most 5 and 15 billion at most to this total; some estimates are considerably lower).

Middle Eastern proven oil reserves are well over 600 billion barrels. Even more important, the cost of oil production is very different in different parts of the world and a central part of the inflexibility of the current systems. It costs only about one dollar per barrel (42 gallons) to get oil out the ground in Saudi Arabia, compared to between 10 and 15 dollars per barrel in many other regions (including the United States). The flexibility of this system to economic shocks cannot be increased by increasing supplies of relatively high cost domestic oil, since downward price shocks can occur through simple increases in production in low cost areas. However, opening up ANWR will likely achieve one goal - up to as much as $100 billion in total profit for oil companies.[8]

Nor will energy security increase measurably. U.S. oil consumption is currently about 7.5 billion barrels per year (20 million barrels a day). If demand continues to increase at somewhat over one percent per year, the United States will be importing about three-fourths of its oil in twenty years, even if ANWR is opened up and supplies as much as one million barrels a day. This will put a strain on the global oil supply systems economically, politically, and militarily. It will also increase carbon dioxide emissions. This is not only unsustainable, it is a recipe for conflict. In other words, this policy would mean that the many conflicts that are, in fact, already going on in the Middle East-Persian Gulf-Caspian-Central Asian region would likely worsen.[9]

As noted above, technology to increase efficiency to between 60 and 100 miles per gallon for cars is available today. Annual consumption of gasoline can be reduced to less than four million barrels per day, over the next forty years compared to the present 8.5 million barrels per day, if progressively stringent standards are set on a schedule compatible with capabilities of manufacturers to install new technologies. This possible reduction takes into account a doubling of car-miles.

Mandating CAFE standards for cars and light trucks together is preferable to taxing gasoline and diesel, since fuel represents a relatively small part of the overall cost of operating a car (though the most visible on a day-to-day basis). Taxing gasoline is also regressive because it most affects middle income and poor people adversely. For these reasons, it is more efficient and equitable to achieve efficiency by requiring manufacturers adopt efficient technology.

Historical experience shows that car makers seem to remember safety when the issue of mileage

standards is raised and seem to remember mileage when the issue of reducing emissions of noxious gases, like nitrogen oxides or hydrocarbons, is raised. In practice they have needed government action to set standards for all three - emissions (other than carbon dioxide), mileage, and safety. All three can and should be simultaneously mandated by the government. Setting achievable standards well in advance also encourages research and development on new technologies, such as new strong materials to reduce the weight of cars and increase safety at the same time.[10]

CAFE standards are needed to force manufacturers to use the best available technology for whatever cars or light trucks they make and sell in the same manner that laws were needed for seat belts and airbags. Standards should be set simultaneously for efficiency and safety since the track record of manufacturers shows that they are reluctant to incorporate either without government pressure. They seem to worry about safety most when the issue of efficiency standards is raised. Their current resistance to mileage standards is a case in point.

Reasonable costs for environmentally sound technologies requires that the cost of many new technologies be reduced. The traditional approach in the United States and in some other countries has been to provide subsidies and tax breaks to alternative energy sources. This approach is also favored in the Cheney Plan. However, tax breaks and subsidies are a poor way to achieve a sustained increase in renewable energy sources and highly efficient technologies, since they tend to lock in higher cost technologies and provide insufficient incentive for investment in technology development. Further, tax breaks are too uncertain and politically vulnerable, which is a source of uncertainty for investors.

IEER therefore recommends that instead of tax breaks and subsidies for new renewable energy development and efficient technologies, the government's resources should be directed to the establishment of appropriate procurement policies.[11] If the government provides a steady market for wind generated electricity, solar electricity, cars meeting efficiency standards, and for distributed generation in federal buildings with interconnection obtained at reasonable prices, then the overall nature of the marketplace will be affected positively. Open bid each year for such commodities would also encourage private sector research and development investments to reduce costs. The federal government can also provide grants to states and local governments designated for such purposes, as it does for a variety of other purposes, for instance sewage treatment plant construction and educational programs.

The Baker's Dozen: IEER Energy Policy Recommendations

1. Adopt sustainable energy system criteria, including the goals of phasing out nuclear power plants as their licensed lifetimes end, unless safety dictates a faster shutdown of specific plants, and reducing U.S. carbon dioxide emissions by 50 percent over the next forty years.
2. Request the National Academy of Sciences to establish a standing committee on the second law of thermodynamics that would recommend what fundamental research needs to be done to develop new energy-related technologies with far

greater efficiency. For instance, this committee would recommend what materials research is needed to improve the efficiency of heat exchangers under conditions of small temperature differences.

3. Mandate stringent fuel efficiency standards increasing progressively to the equivalent of 100 miles per gallon for a CAFE standard that includes all passenger vehicles (including light trucks) by 2040. Stringent safety standards should be simultaneously mandated.
4. Establish stringent efficiency standards for appliances.
5. Dedicate about $5 billion per year for federal purchases of renewable energy, efficient vehicles, and advanced energy conversion technologies (such as fuel cells) for federal use and resale and provide a similar sum annually to states and local governments for the same purposes.
6. Re-establish federal and state regulation of generation requiring reasonable rules for small power generators to connect to the grid. Severe financial penalties should be assessed for failure to comply and especially for any deliberate subversion of the regulations, since the damage to society from continued institutional resistance to the establishment of a distributed electricity grid would be great. The roadblocks to distributed grids, identified in the July 2000 report by the National Renewable Energy Laboratory, should be expeditiously removed by a combination of local, state and federal government action and vigilant enforcement.
7. All major residential and commercial real-estate developers as well as major industrial projects should be required to assess the energy impact of their projects and to consider developing their own local generation systems that would be connected to the grid.
8. The Bush administration should ask the National Renewable Energy Laboratory to do a detailed study of how large-scale wind resources can be brought to play a major role in the electricity system in the next 20 years and in the overall energy system (via hydrogen production) in the two decades after that. (See appendix for IEER's description of wind energy potential.) This study should also address the potential of offshore wind energy in the United States.
9. Ask the National Renewable Energy Laboratory to design a pilot program for hydrogen generation and use that would enable a realistic evaluation of the methods by which a transition to a hydrogen economy based on renewable energy sources can be made.
10. The U.S. government should re-affirm its policy of no reprocessing of spent nuclear fuel and adopt a policy of phasing out nuclear power plants at the end of their licensed lifetimes, unless safety dictates a faster shutdown of specific plants.
11. Establish a task force that would study the potential need for natural gas to be a fuel that would enable the United States and the world to transition to a sustainable energy system by 2050. This task force would look at places where natural gas not associated with oil may be produced in an environmentally safe way and how such gas would best be used to reduce carbon dioxide emissions and phase out nuclear power at the same time. (See Science for Democratic Action vol. 6 no. 3, March 1998).
12. The United States should take the lead in urging major oil companies to

completely end the flaring of natural gas in oil-exporting developing countries such as Nigeria within the next three years. Instead of being wasted by flaring, this resource should be used domestically in those countries and possibly also exported for the purpose of reducing greenhouse gas emissions.

13. All local, state and federal jurisdictions should require utilities to establish just-in-time electricity efficiency plans.

Appendix: Large scale wind energy development in the United States

The Cheney Plan goes into great detail about oil and gas, as well as electricity transmission infrastructure that would make it easier for large companies to generate anywhere and sell anyplace. However, it provides no quantitative analysis of the enormous wind energy potential of the United States. The top twelve states in terms of wind energy potential after land use exclusions, such as national parks or areas with dense populations, is shown in the table below. The wind potential of many other states is considerable, but is lower than the ones listed below due to a combination of factors such as wind speed, population density, and/or other land use restrictions.

Wind Energy Potential, Top Twelve States

(land use exclusions accounted for)

State	Annual electricity generation potential, billion kWhe	Percent of total U.S. electricity generation, 1999[a]
North Dakota	1,210	32.8
Texas	1,190	32.2
Kansas	1,070	29.0
South Dakota	1,030	27.9
Montana	1,020	27.6
Nebraska	868	23.5
Wyoming	747	20.2
Oklahoma	725	19.6
Minnesota	657	17.8
Iowa	551	14.9
Colorado	481	13.0
New Mexico	435	11.8
Total, top twelve	**9,984**	**271**
Total ERCOT (Texas)	~1,000[b]	
Total Western Interconnect (up to approximately the Montana-New Mexico North-South line)	~2,700[b]	
Total Eastern Interconnect (rest of the lower 48 states)	~6,000[b]	

Source: *An Assessment of the Available Windy Land Area and Wind Energy Potential in the Contiguous United States*, Pacific Northwest Laboratory, 1991, as cited in American Wind Energy Association, "The Most Frequently Asked Questions About Wind Energy," accessed via http://www.awea.org.

Notes in table:

a. Electricity generation in 1999= 3,690 billion kWhe (kilowatt-hour electric)
b. The totals for the interconnected regions are approximate since the regions do not correspond exactly to state borders. ERCOT (Electric Reliability Council of Texas) includes most of Texas, but excludes a part of the Texas panhandle. Transmission is currently coordinated within the Interconnect regions. Wind energy totals include only the wind potential for the listed states. Actual totals would be higher if the potential of the states not listed is included. Offshore wind potential would boost totals in all three regions.

Only about one-and-a-half percent of the potential wind resources in these top twelve states would, over 40 years, be equivalent to the entire oil reserves of ANWR (assuming they are 10 billion barrels). Of course, the wind energy potential would still be available after that, while the oil reserves would be exhausted.

A development of the wind energy potential on a significant scale would require the development of transmission infrastructure to feed wind generated electricity into high voltage transmission lines and the infrastructure of some new transmission line corridors in some states. The most expedient approaches in the short term may be to connect Wyoming, Montana, and New Mexico westward, and the Midwestern states with high wind potential to the east.

For more information on wind energy, see IEER's 1999 report, *Wind Power Versus Plutonium: An Examination of Wind Energy Potential and a Comparison of Offshore Wind Energy to Plutonium Use in Japan*. A summary of this report can be found in Science for Democratic Action vol. 8 no. 1(November 1999).