

# SOCIETAL COSTS OF ENERGY

BY MICHAEL NICKLAS

## 1989 AMERICAN SOLAR ENERGY SOCIETY ROUNDTABLE

---

Societal costs of energy are hidden costs that are not included in the price the consumer pays for energy. Societal costs include:

- Environmental costs
- Health costs
- Economic and employment effects
- National security
- State and federal subsidies

Our free market economy operates best when both the buyer and the seller have complete knowledge of which choice will benefit them the most. With energy, this is obviously not the case. How many people know that sulfur dioxide from just our coal burning plants is costing Americans \$82 billion per year in additional health costs? How many farmers are aware that they are annually losing \$7.5 billion per year due to reduced crop yields caused by air pollution? And, how many people are really aware that nuclear waste and decommissioning costs (which, for the most part we have not seen yet) are the equivalent of \$31 billion per year?

Take a closer look at the 7 million barrels of foreign oil that we import each day – an amount that represents 42% of Our total oil consumption and equal to one-quarter of our national debt. Oil imports have risen 7% in the last year – up to \$40 billion. What is oil really costing us? Besides the cost of oil, we are spending between \$14.6 and \$54 billion per year in military costs to protect Middle Eastern oil routes (depending upon who you believe). And, if you count the U.S. jobs lost due to those imports, add another \$30.5 billion. What all of this does to the real price of that imported oil is raise it to over \$49 per barrel. That's a far cry from even the "Alaska Oil Spill" induced prices of \$20 per barrel.

A societal cost study recently conducted by Olav Hoymeyer for the Commission of European Communities concluded that, even without many long-term global warming impacts factored in, the cost of nuclear and coal derived energy in West Germany would double if societal costs were included. Our study, although not complete, has identified up to \$250 billion in annual hidden costs which should be added to the already high \$400 billion per year energy bill. Just the societal costs are the equivalent of \$1,000 per person in the United States. How many people know that their energy is actually costing them that much more?

These "hidden" costs can no longer be afforded. If societal costs were more closely associated with our individual energy needs, the best

**It is really quite amazing by what margins competent but conservative scientists and engineers can miss the mark, when they start with the preconceived idea that what they are investigating is impossible. When this happens, the most well-informed men become blinded by their prejudices and are unable to see what lies directly ahead of them.**

long-term solutions would more likely result and we would certainly see a considerably higher contribution from solar technologies.

### **Hidden Costs of Energy**

<u>Issue</u>	<u>Hidden Cost (\$bil/yr)</u>
A. Corrosion	2.0
B. Crop Losses	2.5-7.5
C. Health Impacts	11.8-82.0
D. Radioactive Waste	4.3-31.2
E. Military	14.6-54.0
F. Subsidies	43.3-55.2
G. Employment	30.6
<b>Total</b>	<b>109.2-258.0</b>

### **Sources**

#### A - Corrosion

Information Source:

1. On Site, "Innovations in Construction," Volume 1, Number 2, 1988. The January 1982 edition of Material Performance indicated the damage due to corrosion (caused primarily to coal) of metal buildings and structures has been estimated at \$2 billion per year.

Conclusion: Damage due to corrosion is estimated to be \$2 billion/year.

#### B - Crop Losses Due to Global Warming, Acid Rain, & other Air Pollution

Information Sources:

1. The Environmental Protection Agency last year reported that ozone pollution was reducing crop yields by 12% (\$2.5 to \$3.0 billion per year). This report was recently updated, through work by the Boyce Thompson Institute for Plant Research at Cornell University. The revised estimate was that crop losses could be as high as 30% (or \$6.25 to \$7.5 billion/year).

2. The Office of Technology Assessment estimates the cost of controlling emissions from all coal plants to range between \$4 to \$6 billion per year causing utility rates, across the country, to increase between 4% and 15%.

Conclusion: Crop losses are between \$2.5 and \$7.5 billion per year.

#### C - Health Impacts

Information Sources:

1. Shepard Buchanan, Bonneville Power Administration, estimates that 80% to 95% of local economic damage attributable to fossil fuels is associated with health risks. Even with low sulfur coal and remote siting, the levelized environmental costs associated with health risks would range between \$.002 and \$.01/kwh. "Energy Facts 1987," Energy Information Administration, lists coal consumption in the U.S. for 1987 at

20.1 quads. Ron White, American Lung Association, presented information at the Roundtable indicating that if new EPA standards were enacted on SO<sub>2</sub> health costs could be reduced by up to \$82 billion/per year.

Conclusion: The health costs associated with utilizing 20.1 quad of coal per year health costs, assuming all low sulfur and remote siting) are between \$11.78 and \$18.89 billion per year. Estimates from the American Lung Association indicate SO<sub>2</sub> impact alone, could reach \$82 billion. Range is between \$11.8 and \$82 billion.

#### D - Decommissioning Nuclear Power Plants

Information Sources:

1. The World Watch Institute study, "Decommissioning: Nuclear Power's Missing Link," 1986, estimates that decommissioning costs add 5% to 25% to the cost of generating nuclear power.

2. Energy Facts, 1987," Energy Information Administration," lists the amount of nuclear power generated for 1987 at 4.9 quads and the average cost of the power at 6.3 cents/kWh.

3. "Decommissioning Nuclear Power Plants," EPRI Journal, July/August 1985, suggests costs of decommissioning as high as \$195 million (1984\$) and the NRC had proposed \$100 million per plant be set aside.

Conclusion: A 5% to 25% increase on 4.9 quads at 6.3 cents per kWh would produce an additional cost of \$4.52 billion to \$22.6 billion per year. If you assume the costs at the \$195 million amount and a 90% capacity factor, cost would be \$.001/ kWh (40 year life) to \$.002/kWh (20 year life), without inflation. At \$.002/kWh, the additional amount for 4.9 quads would be \$2.88 billion.

#### D - Part 2 – Radioactive Waste Disposal

Information Sources:

1. The World Watch Institute study, entitled "Decommissioning: Nuclear Power's Missing Link," 1986, estimates disposal costs in a range between \$1.44 billion and \$8.61 billion per year.

Conclusion: Disposal of nuclear waste between \$1.44 and \$8.61 billion per year.

#### E - National Security, Military Costs

Information Sources:

1. "Projecting US Military Power: Extent, Cost, and Alternatives in the Gulf," Terry Sabonis-Chafee, Rocky Mountain Institute, 1987. The military expenditures by the U.S., in the Persian Gulf in order to protect the oil industry, is estimated to be between \$40 and \$54 billion per year.

2. Quote in Newsweek, by retired Secretary of Navy, John Letiran. He estimates the amount spent in the Persian Gulf to be \$40 billion per year.

3. Howard Moreland, Coalition for a New Foreign Policy, 1985, estimates amount to be \$54 billion per year.

4. A National Defense Council Found report on "The Hidden Cost of Imported Oil" identifies \$14.6 billion per year for military outlays to support oil imports from the Persian Gulf.

Conclusion: U.S. Military spending to protect Persian Gulf oil is between \$14.6 and \$54 billion per year.

#### F - Subsidies

Information Sources:

1. Energy Facts, 1987," Energy Information Administration. The following indicates the breakdown of electrical generation utilizing fossil fuels:

Coal	79%
Petroleum	6%
Natural Gas	15%

2. "The Ridden Costs of Energy," Center for Renewable Resources. 1984. Richard Heede, Richard Morgan, Scott Ridley. (amounts listed below include lost tax revenues, R & D and Agency Funding, Loans and Guarantees. Fossil Electric category has been distributed to various fuels using percentages from EIA.)

<u>Fuel Source</u>	<u>\$bil/yr</u>
Coal	\$7.86
Oil	\$8.92
Gas	\$5.45
Nuclear	\$16.16
Hydro	\$2.35
Conservation	\$0.86
Solar	\$1.70

3. Richard Heede, Rocky Mountain Institute. Suggest that 1984 estimates, in "The Hidden Cost of Energy" study, should be updated and would probably be 18% higher (\$44 to \$52 billion).

4. The Residential tax credits for solar installations has been eliminated, decreasing amount be \$.33 billion. To convert into 1988 dollars =  $(1.405 - .33) \times 1.18 = 1.270$  billion.

Conclusions: Use 1984 number's as bottom of range and 18% increase to reflect top range.

<u>Fuel Source</u>	<u>\$bil/yr</u>
Coal	\$9.28
Oil	\$10.53
Gas	\$6.44
Nuclear	\$19.07
Hydro	\$2.77
Conservation	\$1.02
Solar	\$1.61

#### G - Employment

1. The National Defense Council Foundation report on "The Hidden Cost of Imported Gulf" identifies economic costs, from lost employment due to imported oil, at \$30.6 billion per year

Lost Wages for 300,000 Oil Workers:	\$8.31 billion/year
Lost Wages in Secondary Employment:	\$20.76 billion/year
Lost Royalty Payments:	\$1.48 billion/year
Conclusion: Economic cost from lost wages are \$30.55 billion/year.	