

Taking Responsibility for Care of Creation Alternative Energy Sources

Harnessing the Sun

The Situation with Greenhouse Gases

- People and societies dump 70 million tons of carbon dioxide into the atmosphere every day.
- The world population must cut emissions in half within fifty years to prevent disastrous effects on Earth.
- To reach this goal, the U.S. must cut its emissions by 80%.

Cap and Trade System

How It Works

- Government sets an upper limit on allowable emissions
- This allowable amount is divvied up among power plants
- Power plants that cut their emissions more than required may sell their extra allowance to power plants that did not meet their mark

What Makes Cap and Trade Superior?

- It frees the market to solve its own problem with the incentive to make a profit when successful. (The Clean Air Act of 1990 used Cap and Trade; within 5 years, U.S. utilities cut emissions by 30% more than required.)
- It levels the playing field to encourage new-energy entrepreneurs to emerge. Currently, large powerful energy-producing companies don't automatically get the upper hand.

Command and Control System

How It Works

- Government sets an upper limit on allowable emissions.
- Government decides what renewable energy sources to subsidize
- Government taxes those utilities that do not meet their mark. Polluters merely pay a price for polluting.

What Makes Command and Control a Poor Choice?

- Taxes and subsidies presume that government knows how best to solve the problem. Government does not have the scientific knowledge to make such decisions well, thus costing the consumer more.
- Taxes and subsidies come and go with changes in the political wind, making long-term investment a risky choice.
- It favors the big lobbyists – gas and coal.

The Potential of Solar Power

- Every hour, the sun provides Earth with as much energy as all of human civilization uses in an entire year.
- If only 10% of that solar energy were converted to electricity, a 100 square mile of land could produce enough electricity to power the entire U.S.
- Solar energy requires 6 times less land use than wind energy.
- Solar energy requires 30 times less land use than biofuels.
- Solar energy plants create twice as many jobs as coal and gas plants
- Solar energy plants produce 8 times the retained revenues in the states in which they are located than coal and gas plants do.
- The southwestern U.S. is among the best regions in the world for harvesting solar energy.

Photovoltaics

- Solar cells are made of wafers of semiconducting elements, such as silicon.
- When the peak watt price average falls from the current \$4 to \$1 and the storage problem is solved, solar cells will compete with coal.
- Efficiency is being improved by:
 - Stacking different semiconducting materials
 - Thin film and foil development
 - Nanotechnology
 - Concentrators and trackers
 - Spectral splitting

Solar Thermal Technology

- *Parabolic Mirror:* Long, horizontal parabolic mirrors track the sun and heat synthetic oil used to make electricity.
- *Distributed Power Towers:* Thousands of flat mirrors line the outside of a tall tower. These gather the sun's heat through a single receiver.
- *Mirrored Dish and Stirling Engine:* One end of a canister of gas is heated by the sun. The gas's expansion is used to drive an electric generator. The gas shifts to the cool end of the canister, contracts and repeats the cycle.

Obstacles to Be Surmounted

- *Legislation:* Enacting federal legislation using the Cap and Trade model
- *Financing:* How to interest venture capitalists in investing in research and development
- *Storage:* How to store energy to be used at a later time
- *Regional Transmission Grids:* Constructing transmission lines to carry energy from various sources hundreds of miles from production sites to consumers

Sister Edith Strong