Soft Energy Paths:

The Argument of Amory Lovins for Energy Efficiency and Conservation

The Soft Paths Philosophy

- Developed by Amory Lovins
  - "Energy Strategy: The Road Not Taken?" Foreign Affairs. (1976)
  - "Soft Energy Paths: Towards a Durable Peace." (1977)

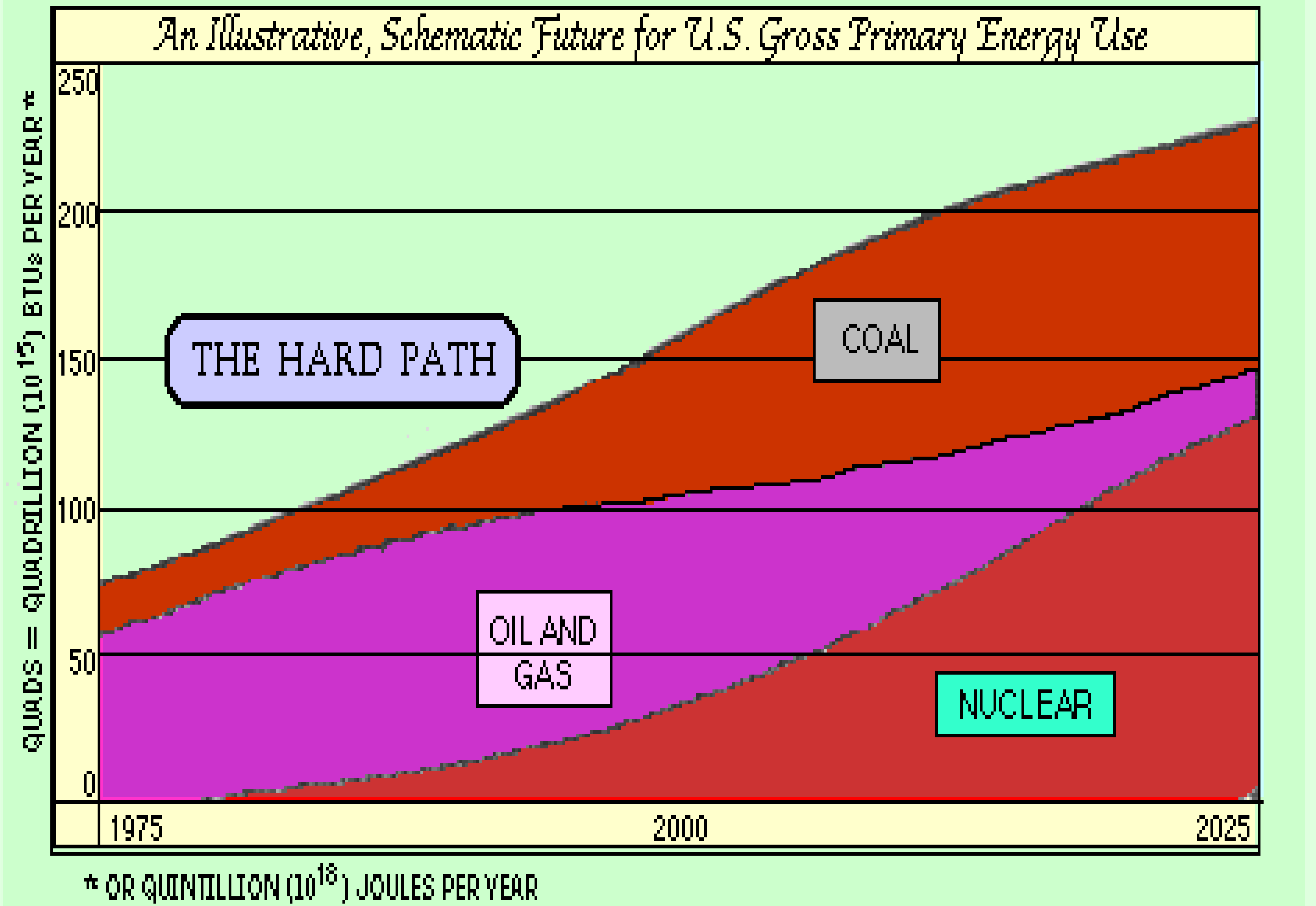
Direction for the United States Future Energy Paths

- Enumerated two paths for future U.S. energy policy:
  1. Expansion of Centralized High Technologies to Increase Supply
  2. Serious Commitment to Efficient Uses of Energy, Combined with Development of Renewables and Transitional Technologies
- Paths are Mutually Exclusive

A Mounting Problem?

- Mr Lovins describes the projected future for U.S. energy policy
  - Rapid expansion of three sectors:
    - Coal
    - Oil and gas
    - Nuclear fission
  - Requires massive investment in infrastructure and the extraction of resources
  - The costs associated with assuring this supply will only increase over time

FIGURE 1


An Illustrative, Schematic Future for U.S. Gross Primary Energy Use
QUADS = QUADRILLION (10 15) BTUs PER YEAR *
250
200
150
100
50
0
1975
2000
2025
THE HARD PATH
COAL
OIL AND GAS
NUCLEAR
* OR QUINTILLION (10 18) JOULES PER YEAR

Alternatives?

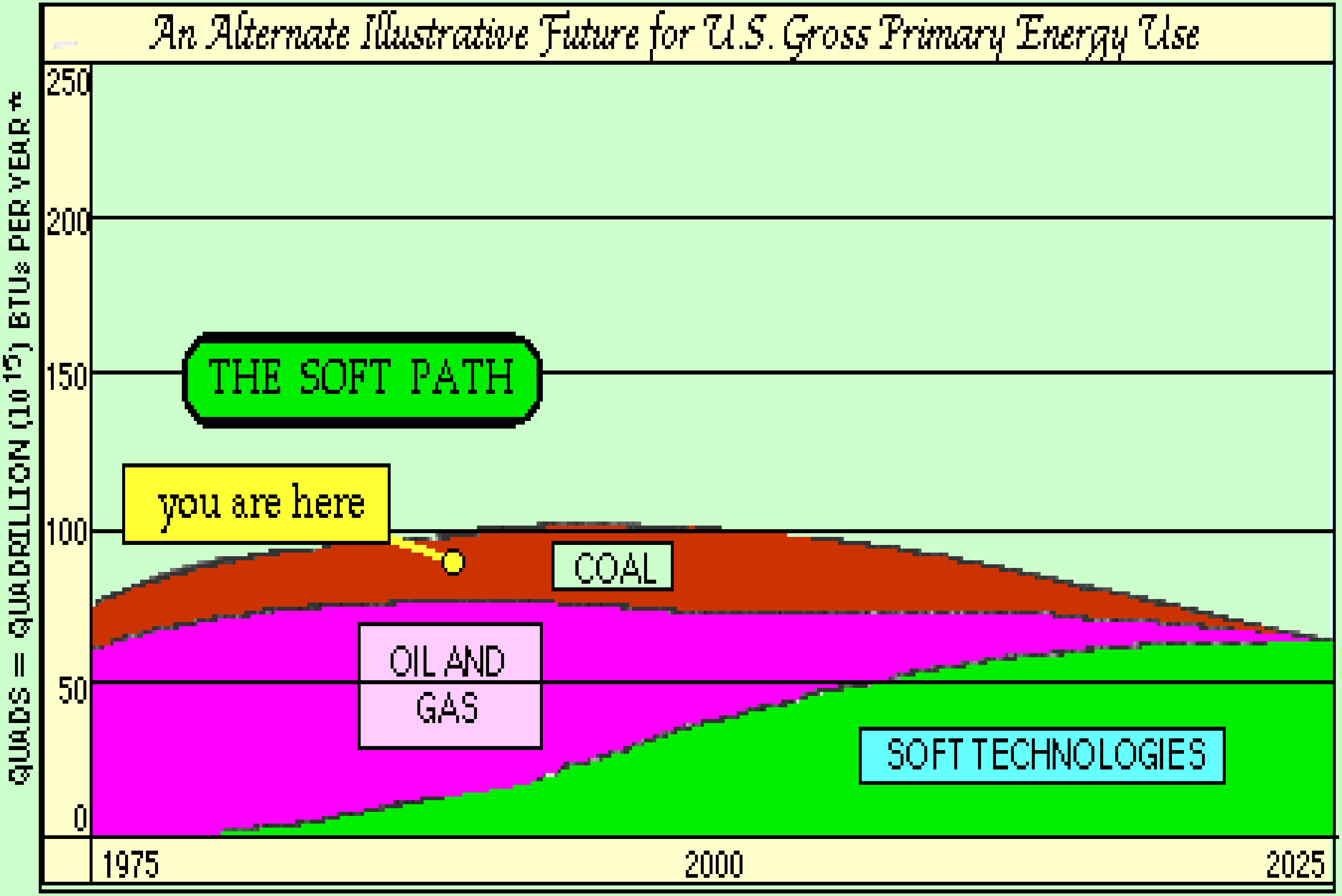
- Lovins writes that there are two alternative responses to increasing supply:
  - Increase technological efficiency
  - Use smaller quantities

- Evidence suggests that technical fixes in efficiency are generally cheaper, safer, and quicker

Soft technologies

- ‘Soft’ technologies are those that are flexible, sustainable, and benign
- Soft energy paths rely upon soft technologies (contrasting to the ‘hard’ energy path that rely upon expensive, complex, and unsustainable techs)
- Five characteristics of soft energy technologies
  - Rely on renewable energy
  - Aggregate a diverse energy supply
  - Flexible and relatively low technology
  - Scale and geographic distribution matched to end-use needs
  - Match energy quality to end-use needs

FIGURE 2



* OR QUINTILLION (10^{18}) JOULES PER YEAR

Economic Advantage of Soft Energy Technologies

- Through appropriate scale and fit to end-use, soft technologies achieve greater economies than large, centralized systems in five ways:
  1. Reducing and sharing overheads
  2. Elimination of infrastructure costs
  3. Elimination of distribution losses
  4. Avoiding diseconomies of scale
  5. Mass production

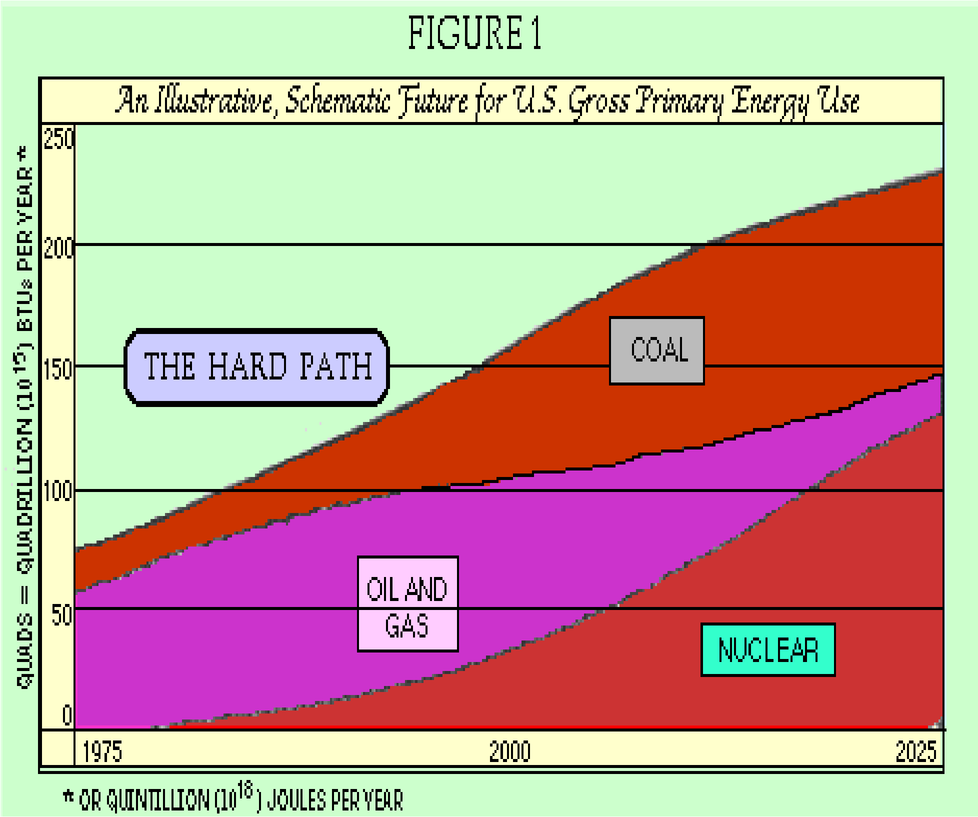


FIGURE 1
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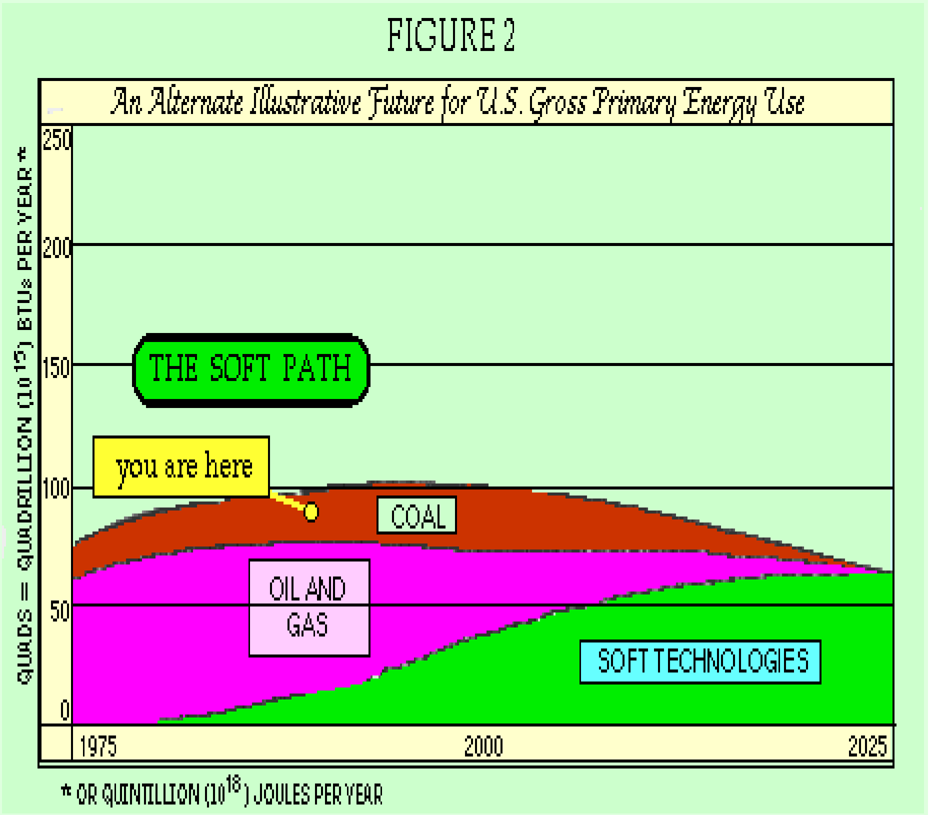
FIGURE 2
An Alternate Illustrative Future for U.S. Gross Primary Energy Use
QUADS = QUADRILLION (10^15) BTUs PER YEAR *
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THE SOFT PATH
you are here
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OIL AND GAS
SOFT TECHNOLOGIES
* OR QUINTILLION (10^18) JOULES PER YEAR

Examples of Available Soft Techs

- Solar heating and cooling
- Use of biofuels and agricultural wastes
- Wind-hydraulics

- Transitional technologies can use fossil fuels more efficiently and as a bridge

Examples for Today

- From RMI:
  - Estimate that the US could save at least 75% of all electricity more cheaply than just *operating* existing thermal power stations
  - The average cost of implementing electricity savings of all kinds has been 2¢ per kilowatt-hour (kWh). In contrast, each kWh generated by an existing power plant costs upwards of 5¢.

Examples for Today-

From ACEEE (residential and commercial only)

Table 1. Summary of Results from Recent Technical, Economic and Achievable Energy Savings Potential Studies.

				Potential (%)		
Region	**Year**	**Fuel**	**# Years**	**Technical**	**Economic**	**Achievable**
California	2003	Electric	10	18%	13%	10%
Massachusetts	2001	Electric	5		24%	
New York	2003	Electric	20	36%	27%	
Oregon	2003	Electric	10	31%		
Puget	2003	Electric	20	35%	19%	11%
Southwest	2002	Electric	17			33%
Vermont	2003	Electric	10			31%
U.S.	2000	Electric	20			24%
Median		Electric		33%	21.5%	24%
California	2003	Gas	10		21%	10%
Oregon	2003	Gas	10	47%	35%	
Puget	2003	Gas	20	40%	13%	9%
Utah	2004	Gas	10	41%	22%	
U.S.	2000	Gas	20			8%
Median		Gas		41%	22%	9%

Note: This table only includes the longest time periods and more aggressive scenarios covered in each study.

Pushing a Bright Idea

Wal-Mart is promoting consumer use of compact fluorescent light bulbs over incandescents. Here's how the bulbs compare.

	INCANDESCENT	FLUORESCENT
Energy used (watts)	60	13
Light output (lumens)	850	800
Average cost (dollars)	$0.25 to 0.60	$2 to 4
Annual savings (dollars)	$0	$8
Annual carbon savings (pounds)	0	roughly 100
Life (hours)	1,000	5,000 to 10,000
Mercury in the bulb (miligrams)	none	4
Mercury emissions (miligrams)	10	2.4
Number of bulbs sold annually*	1.5 to 2 billion	130 to 150 million

**Includes all wattages*

Sources: Environmental Protection Agency; Environmental Defense; Itron; Philips

The New York Times

Sources

- Lovins, A. B. (1977). "Soft Energy Paths: Towards a Durable Peace." Penguin Books.
- Lovins, A. B. (1976). "Energy Strategy: The Road Not Taken?" Foreign Affairs. 55, 65-96.
- http://www.aceee.org/energy/eeassess.htm
- http://www.rmi.org