

The Risk of Nuclear Energy

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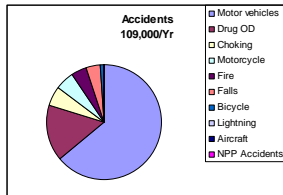
OSU ANS

Thanks to Prof. Rich Denning for the slides

Safety Perspective

- In November 2006, Time Magazine featured the question
*“Why we worry about the things we shouldn’t
and ignore the things we should”*

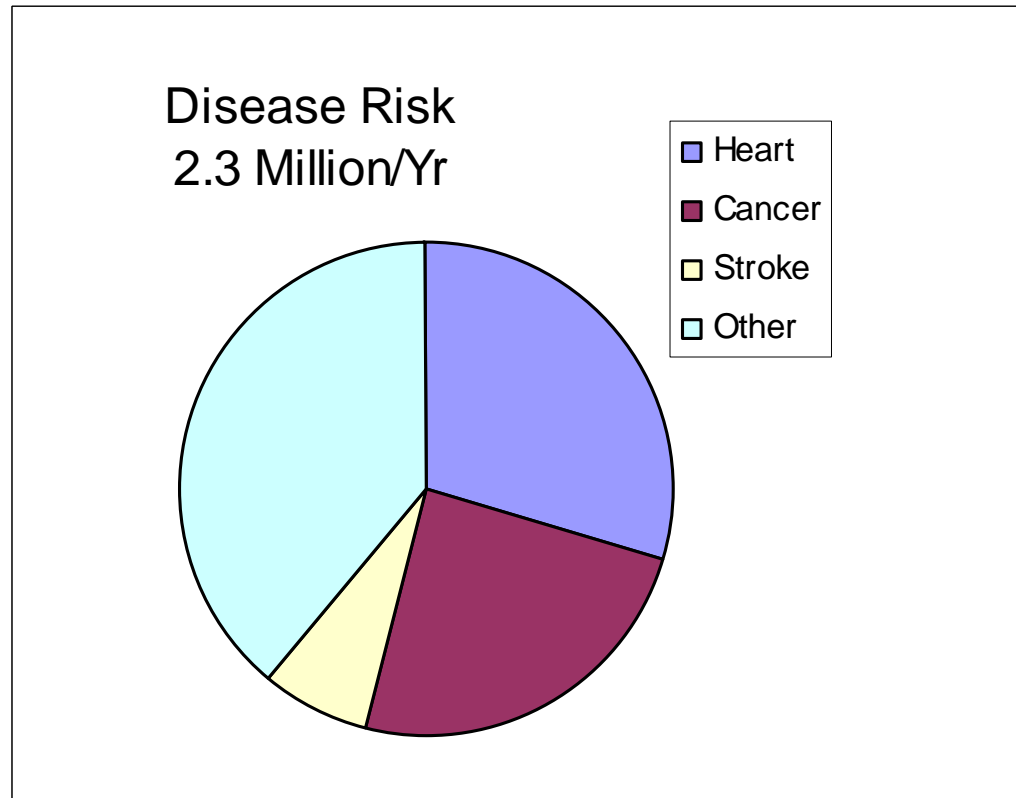
Disease Risks Dominate Personal Risk



Accident Risk

109,000/yr

3.6/10,000 per
person



Accident Risks

Accident	Risk (No./Yr)
Motor Vehicles	45,000
Drug Overdose	11,000
Choking	3,900
Motorcycle	3,700
Fire	3,300
Falls	2,600
Bicycle	760
Lightning	47
Aircraft	22
Marine Animal	1
Nuclear Power Plants	0

Odds of Dying

- Average $\sim 10^{-2}/\text{yr}$
- Accident risk – 3.6/10,000 per yr
- Only period of life in which accident risk is as large as health risk $\sim 10^{-3}/\text{yr}$
 - Men in the period 18 to 20 yr due to automobile accidents
- Cars kill 120 people per day
- Smoking kills 1,200 people per day
- Coal-fired power plants kill 1,000 people per day

What about Chernobyl?

- Chernobyl was a catastrophe
 - Impact goes far beyond the 22 immediate fatalities (which is a bad event but not catastrophic)
 - Increased risk of childhood thyroid cancer in Ukraine and Belarus
 - Possibly a large number of cancer fatalities that could not be measured in the population
 - Definitely severe depression among members of the exposed population concerned about their health
 - Lost of some land use for a century
- But, Chernobyl design has numerous flaws
 - Positive temperature coefficient – large, energetic reactivity accident
 - No containment system
- Chernobyl-like events cannot be ruled out for modern reactor designs but, at worst, they are very low probability events
- There will be no long lasting impact on the environment
 - Wildlife is flourishing
 - Radiation is part of the natural environment
- The societal impact of Chernobyl is no greater than the yearly impact of coal-fired electricity generation on the U.S. population

Risk of War

- U.S. Civil War – 600,000 fatalities (2% of population)
- WWI – 20 million fatalities
- WWII – 61 million fatalities
 - 26 million in Soviet Union
 - 11 million in China
 - 6 million Jews systematically murdered
- Since 1998, 5.4 million in Congo (8% of population)
- Global nuclear warfare – 7 billion people?
 - 1962 brink of global nuclear warfare

Relevance

- An energy crisis is growing that is unprecedented in its impact on society
 - Near the point of peak world-wide oil production
 - Use of carbon-based fuels is resulting in unacceptable global environmental impact
- Wars will be fought over energy supply
- There are no inexpensive, non-greenhouse gas producing alternatives to nuclear power
- The risks from nuclear energy are extremely small – greatly over-estimated by a non-technical segment of the public that has irrational fear of anything nuclear
- The real risks are: warfare, starvation, inadequate water supply
 - All are directly related to inadequate energy

Is Nuclear Power Safe?

- Absolutely!
- That does not reduce the importance of aggressive regulation and an industry that emphasizes safety culture
- But you are the American public. What do you think?