

# Commencement Speech, Penn State University

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In just a few minutes, you will walk out of this room, diplomas in hand, hopes high, ready to take on the rest of your lives. I wish you the greatest of success in all you endeavor.

I also offer a warning: Whatever it is you expect to do, be ready for the sands to shift and the environment surrounding your efforts to change. Your concepts of risk and reward will also shift with the times and with your experience.

Fifty years ago, when I was studying for my Ph.D. in chemistry here at Penn State, we had a clear view of the world we would face. We knew we had a dangerous enemy in the Soviet Union. We knew our children had to practice crouching down in the basements of their schools so they'd be safe when the A-bombs fell.

And – even as we worried about how to contain the atom – we knew it was the power source of the future. We had a saying for that future: “Too cheap to meter.”

Well, today, the Cold War is over... And energy is not too cheap to meter. What appeared to be acceptable risks in the aftermath of World War II came to be considered unacceptable. For example, 50 years ago we produced energy without much regard for the environment. Today, we consider that all of our technology must be held to the most rigorous standards of environmental friendliness and safety.

But what is “safety.”

- How do we measure safety in a society dependent for its enviable standard of living on a complex mixture of science, technology, ethics and environment?
- Is safety being wrapped in a cocoon where nothing can happen to us?

- Is safety insisting on warning labels?
- Or insisting that the government – or some other guardian – assures we face no risks?
- Is it insuring that stock prices can only go up so our investments only grow?
- Or does safety come in gathering the substantive information we need to understand the risks involved in an option and the rewards offered by it, and then deciding how it fits our personal and societal goals?

Consider global warming, a complicated issue that depends on how we interpret very imperfect climate modeling techniques. The Kyoto Treaty, which deals with global warming, has been rejected by the current administration because of a combination of uncertainty about the science and the risk of negative impact on the standard of living in the United States.

Risk and reward. It's an equation that we, as citizens, have to understand. One that we, as a society, have to solve at each fork in the road.

- What about stem-cell research? That's a hot topic today. And one that's leading to some strange political stands. Consider all the anti-abortion legislators who are backing federal funding for research using embryonic stem cells.
- What about cloning? That's another area of deeply divided opinion.
- What are the ethics that attach to these areas of science?
- What are the risks and the rewards?

Let's concentrate for a moment on that issue of global warming and the production of energy in an environmentally benign fashion. Let's home in on one possible choice in the energy portfolio: The matter of the atom as the power source of the future.

I spent a significant part of my career, particularly as director and CEO of Argonne National Laboratory, wrestling with energy issues. These have always been complex, with aspects most people do not know about.

For example:

It's pretty well known that a large fraction of the greenhouse gases that are released in the production of energy come from electrical generation by stationary power plants.

What's more obscure is that the most used fossil fuel in such plants – coal – also releases radioactive materials when it's burned.

One recent set of figures<sup>1</sup> suggests that – worldwide – coal-fueled plants generate about 37,000 metric tons of uranium and thorium a year. About 7,300 tons of that are released in the United States. A single 1000 megawatt coal-powered plant releases about 100 times as much radioactivity into the environment as a comparable nuclear plant. And that includes about 74 pounds of Uranium-235 a year. In fact, back in the 1950s, our Atomic Energy Commission actually considered using coal as a way to produce uranium for bombs.

More than a decade ago, Argonne developed and tested an inherently safe nuclear reactor – one that emits no air pollution, produces little waste, and shuts itself down if anything goes wrong. It even consumes high-level nuclear waste from other plants, converting a storage problem measured in tens of thousands of years into one measured in hundreds of years. The process was terrorist proof and proliferation was not possible.

Washington shut that reactor down in 1994, just when its development was nearing completion. This was because of a change in political views concerning proliferation that accompanied the incoming administration.

Now, understand: I believe we are best served by a portfolio of energy options. Fossil fuels, nuclear, renewable sources, conservation – all have their risks and their rewards. All have their place in the equation. And the balance changes.

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<sup>1</sup> Rhodes, Richard and Denis Beller; *The Need for Nuclear Power*; *Foreign Affairs*, January/February 2000, pp 32-33

Through all the changes, however, we should not throw out options based on politics or on unreasoned fears. It will be up to us citizens to make informed decisions on energy, on the environment, on medicine, on national defense – indeed, on all the controversial issues that stand before us.

It will be up to us – to each of you – to listen to the facts, not the emotions, and to weigh them carefully in making these hard decisions.

Don't get your science and technology information, as many people do, from actors and actresses.

Don't rely on astrological tables for advice.

And don't be afraid of progress. Like gains in nuclear power, which could lead to a sustainable, inexhaustible supply of energy.

And the possibilities inherent in stem cell research.

Remember that you – as educated individuals with the diplomas to prove it – have the right to make choices and the responsibility to understand all the issues that confront us, scientific and otherwise.

Now, before I conclude, let me offer my sincerest regards to the heroes in this audience today – your parents. Their faith, sacrifice and hard work joined with your efforts have brought you here.

And let me also offer my respects to Penn State and its immensely talented faculty.

Your parents and your teachers have worked to provide you with the best possible tools for realizing your goals. What these goals are – and how you realize them – is up to you, but let me welcome you each to the real world with the wish that you will join the educated and principled citizens who will determine the future.

Recognize that you have personal and professional obligations beyond your daily life and work – obligations to the world, to your country, to your fellow citizens, to our children.

In a democratic society, the people – that’s you and me – exercise responsibility to weigh the potential of new technologies ... their risks and rewards ... and to chart the best and wisest course. We owe our high standard of living to science and I’m optimistic that – given the chance – people make rational informed decisions on the issues we face. I’m optimistic that you are such people.

I urge you to deal responsibly with the issues of the years ahead – thoughtfully, carefully weighing risks and rewards based on the best information available.

Good luck and, as the police sergeant on the vintage TV police drama, Hill Street Blues, used to say: “Be careful out there.”

**¾ END ¾**