

Teaching Energy Sources and Environment Together

Robert M. Ross, Don A. Duggan-Haas, & Trisha Smrecak
PRI & Its Museum of the Earth: Ithaca, NY

Presented by Don Duggan-Haas;

dugganhaas@museumoftheearth.org



NSTA Program Description:

Explore the process of teaching the most important topics of our century—sources of energy and the environment impacts of getting and using energy.

About the session:

The processes that transform energy sources into forms that power our lifestyles and power our economy have environmental and ecological costs and benefits. The nature of power generation is changing rapidly and these changes require an informed public to make informed decision-making. All around the country, non-traditional energy sources are being developed or considered and they all have environmental consequences. In many places, the environmental costs of power source development have been externalized – that is, the environmental costs of coal extraction, for example, have not been close to home.

How can we understand what energy development and use does to the environment?

This session will begin by raising a series of questions about energy and its environmental consequences, then we will look at where the fuel that powers our economy comes from and how different energy sources, (primarily petroleum, natural gas, coal, renewable energy, and nuclear power) are divided up amongst the different sectors of the economy that use this fuel (transportation, industry, residential & commercial, and electric power). We will draw data and resources from the US Energy Information Administration Website: <http://www.eia.gov/>.

We will then move onto considerations of *what's the worst that could happen* (adapted from Greg Craven's book of that title and resources on Craven's website, <http://www.gregcraven.org/>) related to the development of different energy sources and what options other than further energy develop exist. Importantly, energy alternatives will be weighed against our energy status quo. We will look at resources related to the specific issue of shale gas, especially involving the Marcellus Shale, and share resources related to our NSF funded outreach materials and programming related to the Marcellus.



<http://www.museumoftheearth.org/outreach.php?page=92387>

What is the Marcellus Shale?

The Marcellus Shale is a black shale formation extending deep underground from Ohio and West Virginia northeast into Pennsylvania and southern New York. It has long been known that the Marcellus Shale holds natural gas deposits; however recent technological advances and commodity price increases have made recovering these deposits very attractive to natural gas companies.

A specific set of considerations related to natural gas extraction from the Marcellus Shale:

Many Americans heat their homes and the hot water within their homes with natural gas. A growing portion of our electricity also comes from natural gas.

- *Where should that gas come from?*
- *Or, should we stop heating our air and water and generating electricity with natural gas?*
- *If we do stop these practices, what should we do instead?*
- *Who is paying the environmental cost for our current energy habits?*
- *Who would pay the costs if the resource is developed?*
- *What environmental and economic costs will come due at a later date?*

Questions to consider for any energy source:

- What are the environmental costs and benefits of the energy status quo?
- What happens to the environment at the point of extraction?
- What wastes are generated and disposed of away from the point of extraction?
- What happens to the environment as a result of use?
- Per unit of energy generated, how do these impacts compare for the different energy sources being considered? (This may be a comparison of a proposed or new source to the status quo.)
- Which is greater, the cost of development or the cost of efficiency measures? Stated another way, in the consideration of developing a source that provides 45MW hours/year, would it be more beneficial (or more costly) to reduce consumption by 45 MW hours/year instead?

These questions generally frame the issue as a choice between developing a new energy source and maintaining the energy status quo. *There are more than two choices.*

- What other options exist?
- Are they being seriously considered?
- Are they practical? Why or why not?

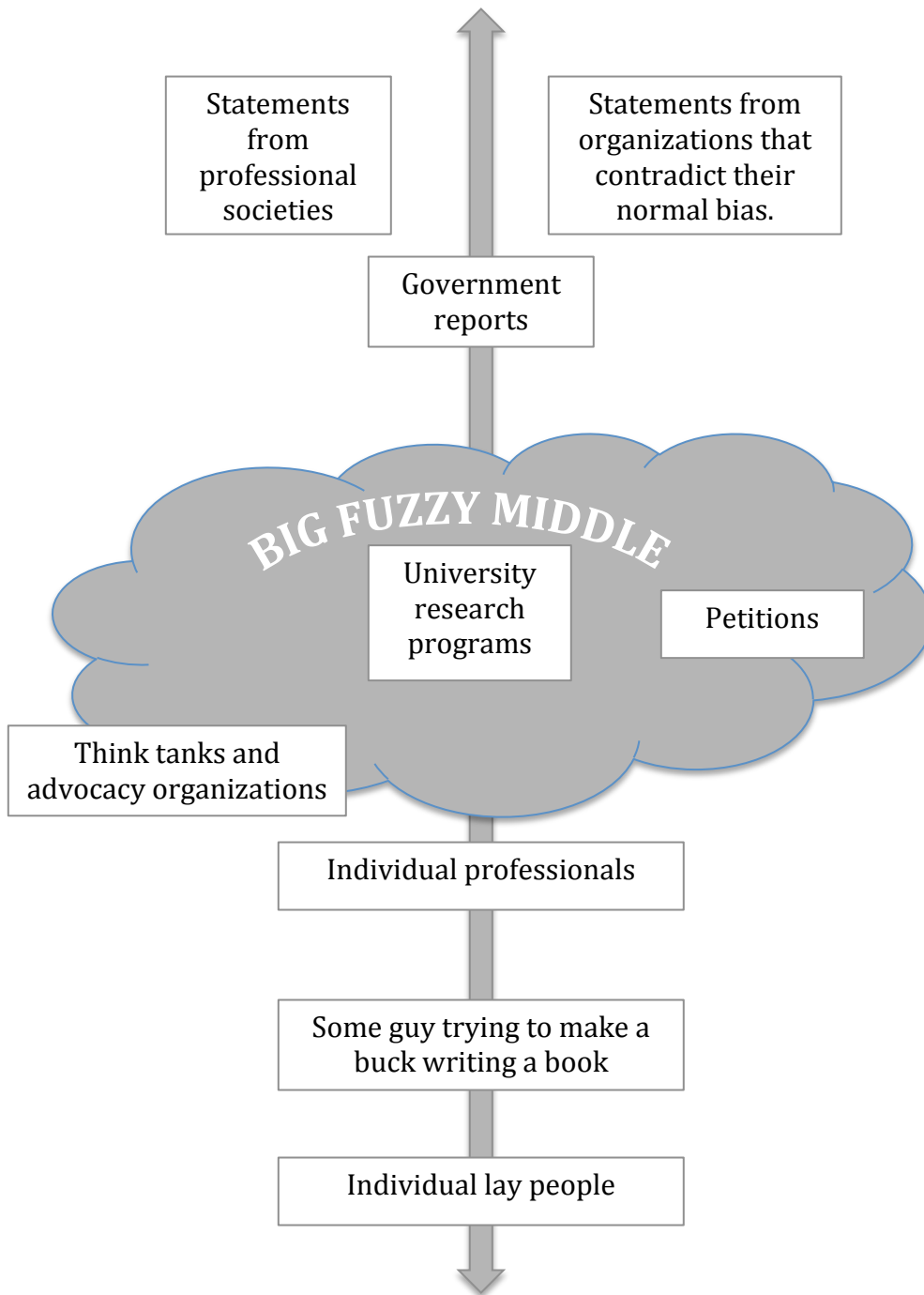
More pointed questions to consider for any energy source:

- Are accidents known to kill or injure people? Consider extraction, transit, and use. How does the death and injury rate compare to other sources/unit of energy.
- Does standard use alter the environment in ways known to kill or injure people? How does the death and injury rate compare to other sources/unit of energy.
- Are there political costs or benefits associated with this energy source? Is the military involved in the protection of this resource?

This material is under development and feedback is encouraged:

How can we make these materials better? What have we done well? Please let us know! Contact Don Duggan-Haas at dugganhaas@museumoftheearth.org.

MORE CREDIBLE



LESS CREDIBLE

A naked credibility spectrum for the global warming debate. Or other stuff.

Craven, G. (2009). *What's the worst that could happen? : a rational response to the climate change debate* (1st ed.). New York: Perigee.

