

PAN Lesson Plan

NC Standard:

Chm.1.1.4

- Compare the penetrating ability of alpha, beta, and gamma radiation.
- Compare radioactive decay with fission and fusion.

Objective:

Students will compare and contrast SMRs (Small Modular Reactors) with traditional nuclear reactors. This will be an activity that follows the above standard. Students will apply what they have learned about nuclear processes to compare technologies utilizing nuclear reactions. (Charlotte is the location for one of the first companies to be given a contract for building an SMR. I will be in touch with the company to arrange a visit from a company representative, if possible).

Materials:

IPads, computers, cell phones, whiteboards

Topics to research:

1. Cost comparison per kWh
2. Safety issues
3. Waste disposal
4. Vulnerability to terrorists
5. Environmental/siting issues

Procedure:

1. Group students to provide each topic to be addressed.
2. If the technology for researching topics may not be available, have 1-2 copies of each of the listed resources in hard copy format.
3. Students will gather the background information to enable them to present arguments for/against SMR/traditional plants. (Common Core Reading)
4. After about 30-40 minutes for preparation, students will present their findings on the whiteboards. The rest of the class will take notes, and ask questions.

Assessment: Students will use their notes to write a short essay comparing and contrasting the benefits/hazards of both technologies. (Common Core Writing)

Resources:

<http://www.foxnews.com/politics/2013/07/30/mini-nuclear-plants-next-frontier-us-power-supply-or-next-solyndra/>

SMRs - Small Modular Reactors

Charlotte-based Babcock & Wilcox mPower division is working on that project.

Resources:

<http://nuclearinformation.wordpress.com/2013/07/14/small-modular-nuclear-reactors-have-some-big-safety-and-insurance-problems/>

pdf in Dropbox (Legos for Adults?)

<http://www.power-eng.com/articles/npi/print/volume-2/issue-3/nucleus/small-modular-reactors.html>

Good graphics/diagrams - background information

<http://www.nei.org/Issues-Policy/New-Nuclear-Energy-Facilities/Small-Reactor-Designs>

http://babcock.com/products/modular_nuclear/

B & W site

<http://www.popularmechanics.com/science/energy/nuclear/next-up-in-nuclear-small-modular-reactors>

<http://www.forbes.com/sites/jeffmcmahon/2012/05/23/small-modular-reactors-by-2022-but-no-market-for-them/>

Can Nuclear be competitive with cheap gas/oil?

<http://www.gizmag.com/small-modular-nuclear-reactors/20860/>

Readable explanation

<http://energy.gov/ne/nuclear-reactor-technologies/small-modular-nuclear-reactors>

DOE Resources

The above will provide background information for the activity. SOME of it will be used by students.