The Nature of Science/Common Core Math Practices

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The article that I reviewed is from the January/February 2018 Popular Science magazine titled, "Going All the Way (Renewable) *Is it Smart-Or Crazy Stupid-To Rely Solely on Wind, Solar, and Hydro?"* As the title suggests, the article was focused on the suggestion that renewable energy could be a viable option for energy at the level of even 100%, specifically on the islands of Hawaii. The three tenets of the Nature of Science from NGSS that I have selected to target are: Scientific Knowledge is Open to Revision in Light of New Evidence, Science is a Way of Knowing, and Science is a Human Endeavor. The Common Core Math Practices I have selected are: Making sense of problems and persevere in solving them, Construct viable arguments and critique the reasoning of others, and Using appropriate tools strategically.

Scientific Knowledge is Open to Revision in Light of New Evidence

In 2015, Hawaii became the first state to legalize the requirement that all utilities generate electricity from 100% renewable sources by 2045. In light of "new evidence," another source of biofuel is being tapped for energy in Hawaii. Unlike corn ethanol, a practice that is a hard on soil, small bang-for-the-buck energy source, the pongamia tree is being used to produce energy by a company called TerViva. The trees' seeds are oily and can be turned into biodiesel and even jet fuel. The tree happens to be a legume, which instead of stripping the soil of nutrients like corn, actually returns nitrates to the ground. Only the seed is used to produce oil, so the tree continues to grow, scrubbing CO_2 out of the atmosphere. This is just one example of many new ideas and developments that scientists and engineers are working on to improve the energy economy of Hawaii, and at the same time reduce the effects of climate change. (Kaufman, 2018)

Science is a Way of Knowing

In this article a company called Energy Excelerator, working in Hawaii, is a non-profit fund that supports potential energy tech companies. Their CEO Dawn Lippert seeks out tech dreamers, and entrepreneurs, people who have great ideas that need financial support to get off the ground. It has generally been considered an impossibility that 75%, let alone 100% of a energy could come from renewable sources, but Lippert has hope. Science is a way of knowing, a way to make sense of the natural world. The Sun provides 99.9% of the energy in our world, yet historically has provided less than 1% of the United States' needed energy. That is until recent developments in technology have reduced solar panels' costs. Hawaii's overabundance of sunshine, and cheaper solar panels have significantly increased this percentage.(Kaufman, 2018)

Science is a Human Endeavor

Of the nineteen staff at Energy Excelerators, 14 of them are women in the 20's and 30's. (Kaufman, 2018) New technologies are continuously being developed in an effort to reduce global warming due to the burning of fossil fuels. The human race; male, female, people from all nations, everyone, everywhere, will benefit from the continued effort that is taking place in Hawaii, as the nation watches to see if the 100% renewable energy goal for 2045 will be achieved, or not. Time will tell. Scientists, engineers, entrepreneurs, and tech dreamers will do all that they can to make it a reality.(Kaufman, 2018)

Making Sense of Problems and Persevere in Solving Them

This article spoke often in terms of percentages, going from Hawaii setting a goal of 70% renewable energy in 2030, to 100% in 2045. In the 7th grade, calculating percentages is still a

challenge. This would be a great time to collaborate with the math teacher to help students gain a conceptual understanding of percentages. It is not inherently known or understood, and the idea of growth in the percentage of the amount of renewable energy, and the subsequent decline in non-renewable sources of energy could potentially lead to greater understanding.

Construct Viable Arguments and Critique the Reasoning of Others
Not everyone believes in the viability of 100% renewable energy. Not in 2045, not ever some say. (Kaufman, 2018) The crosscutting concept of making a claim, providing evidence, and supporting your reasoning (C-E-R), could be done using this article and other available research on climate change. Students could be provided with data and graphs that show the increase in CO_2 in the atmosphere that corresponds with a slight increase in average global temperature over the same time period. Helping guide students to understand the reason that some feel differently about renewable energy versus non-renewable could be a real-life learning experience.

Use Appropriate Tools Strategically
While the article did not address temperature specifically, a conceptual understanding of the kinetic theory, temperature and heat are required for "getting" the problem with climate change. Students could be introduced to measuring temperature with a Celsius thermometer, temperature probes, or even an infrared laser thermometer. These are appropriate tools to be used in a STEM classroom.

Finally, the article is chock-full of new ideas and advancements in technologies that could lead to an increase in green or renewable energy. This is a real-world example of STEM in action. The scientific knowledge, the technological developments, the engineering of better energy storage devices (and many others), and the math component all roll together for a truly integrated STEM lesson.

-Kaufman, L. (January/February 2018) Going All the Way (Renewable) *Is it Smart-Or Crazy Stupid-To Rely Solely on Wind, Solar, and Hydro?* Popular Science, 34-41

Popular Science - Going All the Way (Renewable)